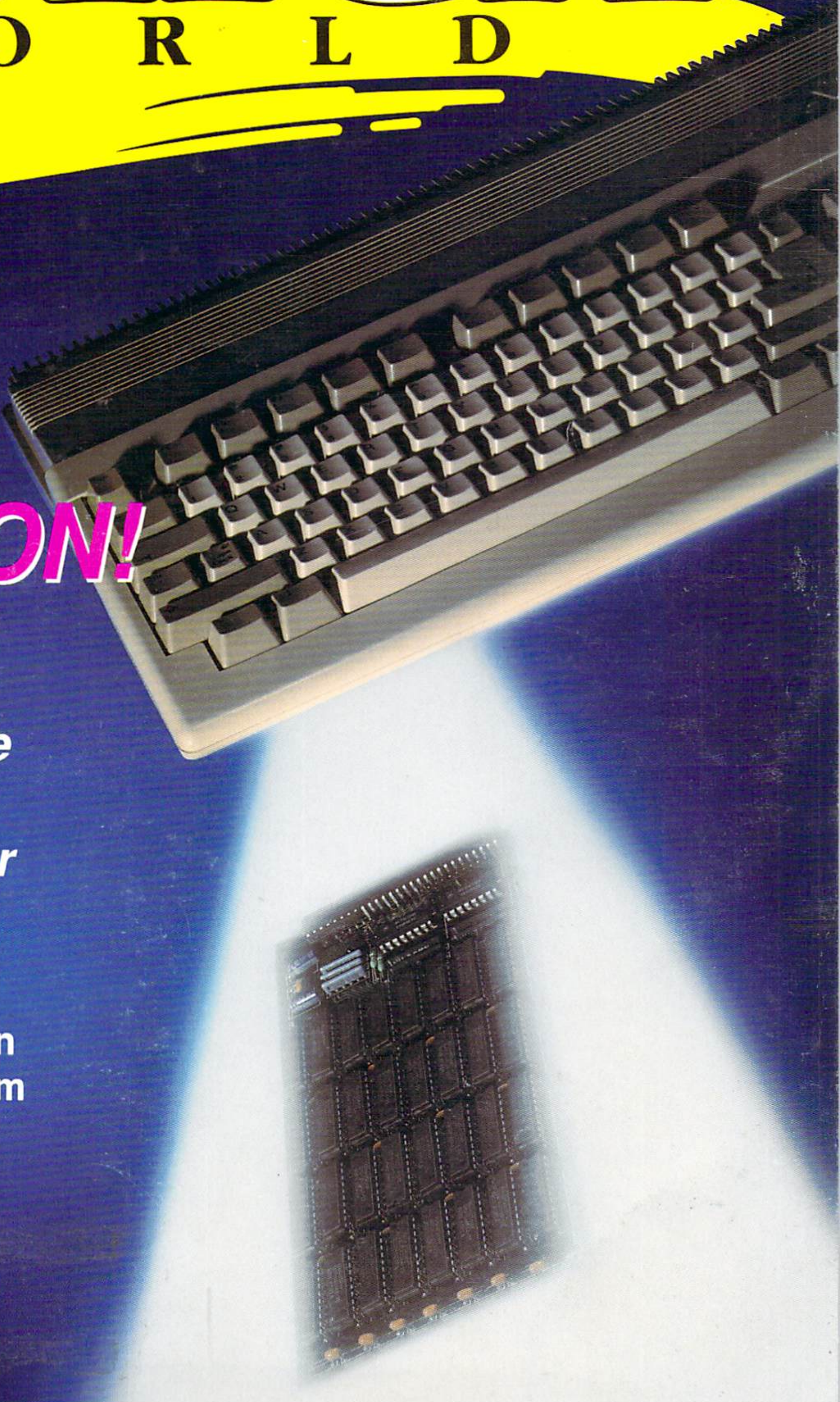
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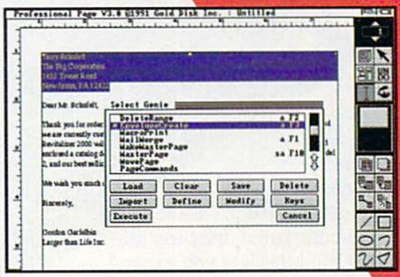
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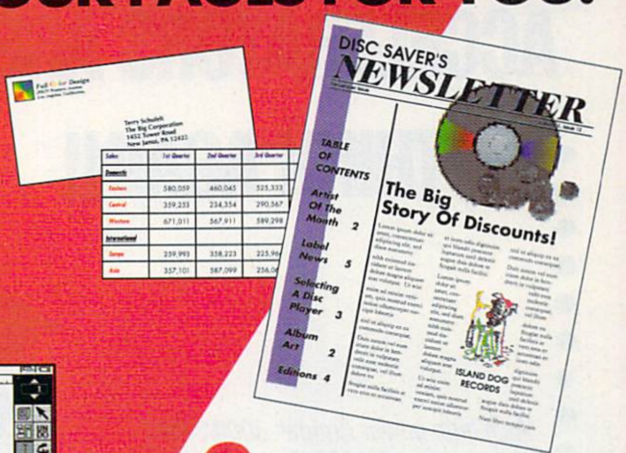
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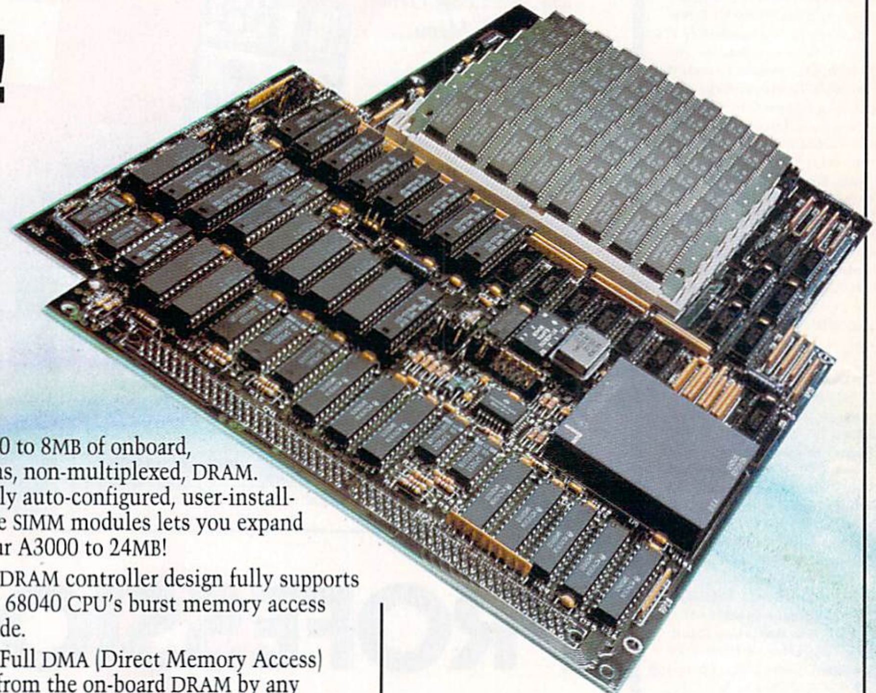
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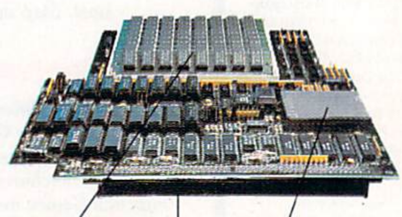
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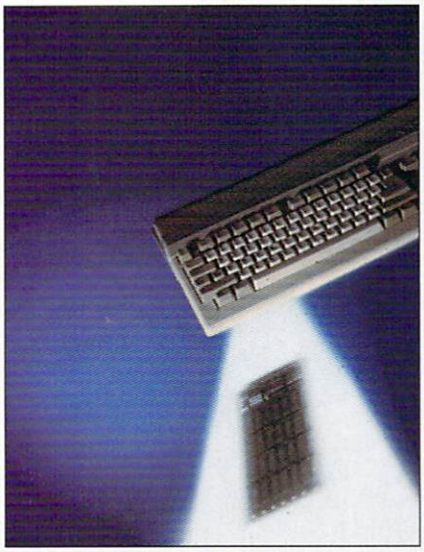
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VOLUME 8, NUMBER 6, JUNE 1992



As our cover (inset, above) may suggest to imaginative sci-fi types, this month's theme could be dubbed "Close Encounters of the Hardware Kind." We want to help you push whatever Amiga model you use to incorporate new-found power to achieve any task you desire. That's why we're covering every facet of internal A500 expansion, everything you ever wanted to know about RAM upgrades, and a whole array of display possibilities to suit every application. So, get ready to sink your teeth into some heavy metal.

COVER PHOTOGRAPH BY ED JUDICE

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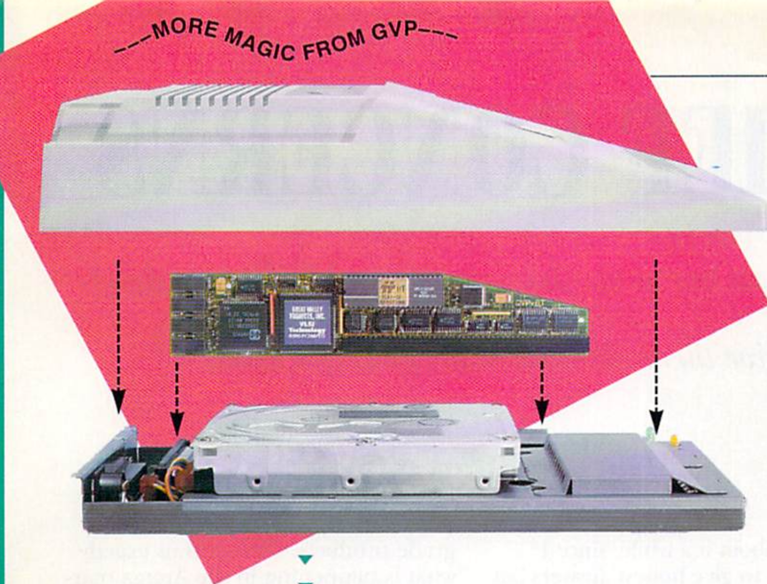
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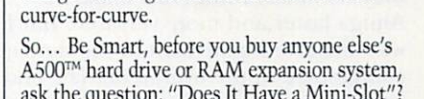
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CHIEF CONCERNS

Amiga users are in the driver's seat and looking to developers to give them new and more powerful tools.

AT SEVEN O'CLOCK on a freezing New Hampshire morning, a crew of five from Great Valley Products arrived at the vast and well-lit *AmigaWorld* offices. Within minutes they commandeered our large conference room, making it look like a full-scale computer show was about to open.

By nine AM, they had hauled in some two dozen products and set up full demos of a good handful. They had even flown in Ad Wisman, a talented programmer from Holland, who held his long red beard together with a band of solder. All right! All we had to do was buy lunch and sit comfortably for about six hours while the demos and speeches ran on.

The GVPers made this trek because *AmigaWorld* is read by over 100,000 potential buyers. They wanted to bowl us over with the full force of their product line. After all, there's considerable wampum at stake. There were also unconfirmed reports that company VP Gregg Garnick wanted to ski.

Don't get me wrong. I was plenty interested in the products. After all, they do handy things like make the Amiga faster and more versatile. But I was distracted quite a bit of the time in contemplating the overall market, and everything the guys from GVP said or did confirmed the idea that the company is really a microcosm, a big microcosm, of the US market.

Let me explain. A few weeks before they came, I got a call from a reporter on a Philadelphia business magazine who was doing a piece on GVP. Like any good reporter, he asked tough questions about their future, and specifically whether their being wholly dependent on the Amiga created risk. What if sales of the machine dried up? Wouldn't GVP be sucking the proverbial canal water along with every other vendor?

I thought about it a while, since I generally like to give honest answers but don't want to be embarrassed by saying something stupid in print (this column, of course, being the exception).

"No," I said. "I don't think GVP's health is really that dependent upon sales of the Amiga."

"Huh?"

I went on to explain that this market is plumb unique. The users are more or less in charge, and they are driving the machine into more and more advanced and specialized uses. I don't mean to insult you if you play games or use productivity software. Most of us do, and the lack of commitment to general-purpose Amiga users is a crime. Instead, I'm talking about the market's general direction.

I would guess that a large percentage of Amigas sold in the US go to people who already have an Amiga (I think Lou Wallace alone has half a dozen), use it seriously, and are looking for a more powerful machine to do graphics, video, animation, multimedia, music, or what have you.

What all this means is that most people with Amigas are not giving them up. They have too much invested in hardware, software, and learning to switch, even if something else could do the job. Physicists call this inertia. To me, it's just smart thinking.

So two types of companies clean up in a market with such inertia. One makes leading-edge products, stuff that just hasn't ever been available. The other type provides solid products to improve your system: hard drives, accelerators, and the like. If you can do both, you're golden.

It's kind of like owning a car. You can have the greatest roadster in the world, but if you can't get a muffler, hot tires, or a bigger carburetor, you'll trade it in for the next best thing. Even a stinking and wheezing day-old Yugo is better than a car with no parts.

GVP, like some of the other hardware sharpies, is selling an awful lot of upgrade products. That tells us exactly what is happening in the Amiga market. People treasure their machines and like to soup 'em up.

We need this steady, reliable supply of performance replacement and upgrade components, as well as the well-regarded stream of products that further push technology. These batches of silicon let us know that our machines are sound and the capabilities growing. Nice little confidence booster, eh?

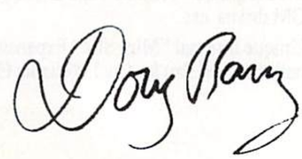
And what exactly did GVP show? Look for details in future issues, but here are the highlights. First, ex-Commodore engineer Jeff Boyer showed how they revamped the existing line of accelerators and cranked out a few brand-new ones. The fastest, I'd guess, is the G-Force 68040 board, into which you can plug faster processors.

That's nice enough, but the really exciting accelerator is the A530. With this, you have an A500 that is not only faster than a 3000 (soon to be old hat), but has up to 8MB of RAM, a hard drive, and a PC emulator, all within one expansion box. Hot dang!

PhonePak, a unique fax/answering machine/voice-mail device is high on their list. They think this will sell Amigas outside of our traditional markets.

For the IV24, they showed an RGB splitter/encoder/decoder for switching between video and computer sources, the starting point for some swell transitions. To wrap up the session, Dutch programmer/professor Wisman showed his photographic theory-based, image processing package for the IV24.

By nightfall, the conference room was cleared of debris, and I walked to my car thinking about one word: inertia. ■





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Plus, the G-Force 030 Combo plugs into your A2000's CPU slot, leaving all your normal expansions slots open and free for other uses!

It's no wonder we say the G-FORCE 030 Combo is the *Must Have* Add-on for your A2000.

IT'S A COMPLETE SYSTEM ON A SINGLE BOARD

Just look what you get from this workhorse, powerhouse:

- 50Mhz 68030 or 40Mhz 68EC030 CPU. Whichever one you choose your A2000 will out-perform even the latest A3000 systems.
- 50Mhz or 40Mhz 68882 FPU, math processor.
- 4MB of high performance, 60ns, 32-bit wide RAM expansion. User upgradeable to 16MB with easy-to-install 4MB SIMM modules.
- High Performance, Auto-booting, DMA SCSI controller which can DMA directly to/from the full 16MB range of 32-bit wide RAM — just like the A3000!
- SCSI connectors for connecting both internal and external SCSI peripherals.
- Hardware support for mapping the A2000 Kickstart ROM into the high-speed 32-bit wide on-board RAM. It's like caching the entire operating system!
- Icon-based, Software Switchable, 68000 Fallback mode.
- Converts to Hard-Disk-Card with Optional Hard Drive Mounting bracket.

AND FOR THE *MUST HAVE* OF ALL HARD DISK CARDS...

Our optional "Hard-Disk-Card" Conversion Kit turns your G-Force 030 Combo board into a Hard-Disk-Card — the drive mounts directly on the Combo board itself — even saving you a peripheral bay! For real price/performance ask your dealer about our factory installed 120MB or 240MB Quantum hard drive bundles - look for our seal! Not only do you get a great price but with our new two-year warranty, you will get the piece of mind you deserve.

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OVERSCAN

News, New Products and Networks

Two if by CeBIT: German Show Sees Launch of Amiga 600 Pair

HANNOVER, GERMANY—Every March, the world's largest computer show invades Hannover, Germany. This year, over 600,000 people descended upon the show's 21 exhibition halls in just eight days.

The largest crowds collected around Commodore's three booths, which represented the company's three separate activities in Europe. To impress the mostly PC-oriented CeBIT attendees and improve its position as Germany's second largest seller of IBM clones, Commodore focused on its MS-DOS machines. The main booth was dominated by PCs—from 486 EISA machines to notebooks. In a press conference, Chairman Irving Gould announced the opening of new sales offices in eastern Europe, starting with Warsaw, Poland, and stated that Amiga sales increased 21% in the last quarter of 1991.

Power Full

Here in the world's largest Amiga market, there was greater interest in the second booth, which showcased multimedia applications on Amiga 3000s and 3000Ts. The newest ray-tracing software versions showed up, as did a PAL 24-bit framebuffer, an Amiga CAD system, the **Scala** presentation system (***Digital Vision A/S***), and ***Digital Creations'*** **DCTV**. East German newcomer ***SEK'D*** presented a complete Amiga **sound system**—including 8-, 12-, and 16-bit sampling, MIDI sequencing, and sound expansion all in one package—with ARexx support and free editing possibilities.

On a huge video wall, ***CBM*** presented its experimental Amiga-based multimedia application. Called **Cyberama**, it is a blue-box system in which a person in front of a video camera activates computer gadgets and moves "objects" by pointing at them. The computer analyzes the movements and handles collisions with computer images. In the final video picture, the person appears genlocked with the computer graphics.

Also in this booth was CDTV, now presented as a complete Amiga system. Called **Amiga-CDTV,** the package includes a keyboard, floppy and hard drives, a modem, and a mouse, in addition to a CDTV. With this and the A570 CD drive for the Amiga 500, Commodore hopes to establish a new family of multimedia home computers.

500 Minus Expandability Equals...The New 600!

Commodore's third booth—the home-computer booth—hosted the first official showing of the new 2.04-based **Amiga 600** and **600HD** (the latter with a 20MB

Continued on p. 12.

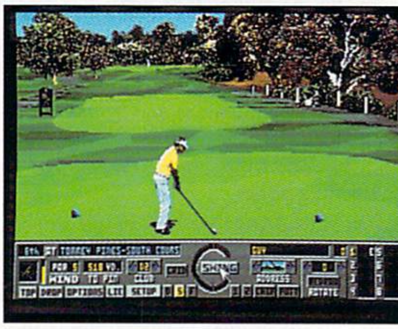
Pick Up the Pace

Great Valley Products (GVP) has recently come up with three new ways to put you right in the fast lane.

Following in the footsteps of GVP's Series II A500-HD8+ subsystem, the **A530 Combo30–40** features a 40-MHz 68030 accelerator; slots for up to 8MB of 60-nanosecond (ns), 32-bit RAM; a floating-point-unit socket; and the choice of a 52, 105, or 240MB built-in SCSI hard drive. Sweetening the deal is a miniature slot that accommodates the **GVP/PC286** ($425). This PC/AT emulator provides a 16-MHz 286 processor, 512K of RAM, a socket for an 80C287 FPU, and various video emulation modes: Hercules, CGA, monochrome EGA/VGA, and T3100. (Note that MS-DOS is not included.)

A 28-MHz 68040 accelerator (with an on-chip MMU and FPU) for the A3000 or A3000T, the **G-Force 040** board supplies two megs of 40ns, 32-bit RAM and can support up to six more. For increased performance, you can copy and transparently map the 2.0 Kickstart ROM into G-Force's memory. With 2MB, the board is $2799; an additional 4MB sets you back $899 more.

Now available in 25-, 40-, and 50-MHz versions, the **G-Force 68030 Combo** for the A2000 includes a 68882 FPU, 60ns, 32-bit RAM, and a SCSI controller (with its own 14-MHz controller chip). While the 25-MHz board comes with 1MB of RAM (expandable to 13MB), the 40- and 50-MHz boards each come with 4MB and hold up to 16MB. In addition, GVP supplies a 120 or 240MB Quantum drive with the 40-MHz board and offers a 240MB drive with the 50-MHz board. For complete pricing, contact GVP. (RS# 107.)



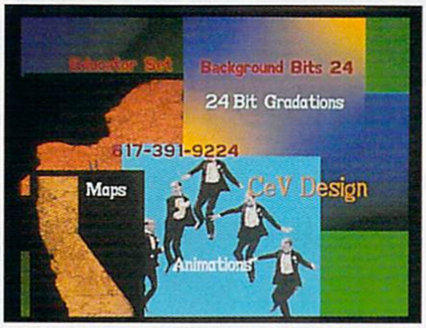
Fore!

Can't afford country-club fees? Tee off with **Links** ($59.95), the HAM-mode golf game from ***Access Software***. Links puts you on the greens of such championship courses as San Diego's Torrey Pines (additional course disks are in the works). While you won't need a membership card to play, you will need 1MB of memory and a hard disk. (RS# 104.)

To locate the vendors of the products mentioned, see the "Manufacturers'/Distributors' Addresses" list on p. 102.

Video Takes

You can't get good results from badly tuned equipment, so ***Vidia*** offers the **Video Calibration Set** ($49.95). A collection of 41 IFF images, the set turns a genlock-equipped Amiga into a test-pattern generator for composite or RGB monitors. The various IFFs test for color, brightness and contrast, electron-beam convergence, phosphor burn, and interlace flicker, as well as spatial, color, and gray-scale linearity. (The supplied presentation software displays the images at the click of a mouse.) The package also includes three printed test patterns for checking a video camera's interlace coherence, local and overall aspect ratio, contrast, and detail. (RS# 101.)



Ready set Educator Set!

With your camera and monitors tweaked to perfection, you're ready to work. To set your video's mood, ***CeV Designs*** offers a selection of backdrops in the **Educator Set** ($39.95), which comprises Volume 6: The Educator V2.0—World Maps; Volume 11: The Reporter—School Sports; and Volume 12: The Producer. The four-disk Volume 6 contains topographically textured maps of the US, individual states, and various countries. The two disks of Volume 11 hold hi-res scenes of school sports, school environment, and graduation, while the political disk from Volume 12 houses screens with governmental and historical political images. (RS# 102.)

Combine computer graphics and ►



ON-LINE SCAN

By Tim Walsh

A computer topic made headlines in the news early this March, placing an overdue wake-up call to the entire computer industry. "Computer experts" came out of the walls, unwittingly infusing higher doses of anxiety into panic-stricken PC owners by making dire predictions on prime-time TV. Sales of antivirus programs soared, and many PC owners dared not turn on their computers that fateful day of March 6. Although coverage of Michelangelo may have seemed excessive, the resulting awareness allowed many people to escape damage.

At the risk of being labeled a "computer expert," I admit that several people asked me how to avoid Michaelangelo. I assured them that the virus would strike only MS-DOS compatibles, and that their computers should be fine as long as they had an up-to-date memory-resident virus checker in place.

The scare gave Amiga users pause. After all, whether you own an Amiga, Mac or PC, or any combination thereof, we're singing in the same choir when it comes to computer viruses and the precautions needed to be safe from them.

Online Solutions

Partially because the networks are such a timely source of files, they are the most valuable resource on the planet for antivirus utilities. In the days before Michelangelo struck, a television report noted that CompuServe was receiving a record number of calls from folks searching for virus checkers.

Scanning the nets for these programs is confusing because of the wide selection. For years I have been a strong supporter of Steve Tibbett's VirusX (now in version 4.01). You can find various revisions of it on every major net by searching on the keyword VIRUSX.

In addition, here is a sampling of heavily downloaded files from each net that I found to be exceptional virus catchers:

BIX: Zerovirus version III (zvirusiii.lzh) resides within the Amiga.user area. With its wild graphic interface, a "brainfile," and a facility for checking memory by address, Jonathan Potter's program uses only 1K of chip RAM.

CompuServe: Check out BIG312.LZH in the AmigaTech area, library 11. The latest revision of Erwin van Breemen's BigBrother is a "virus-infection detection" program that prevents programs from starting a virus in memory. BigBrother also can start a new shell, handle scripts, and permit viewing and installation of bootblocks.

GEnie: File #14406 in Amiga library 4 is VIRUSZ212.LHA, the latest version of VirusZ by Georg Hoermann. Version 2.21 claims the ability to detect over 146 bootblock viruses.

Portal: If download counts are reliable indicators, the highly functional Virus_Checker 6.01 (Amiga Zone Library 29, file 42, VCHKR601.LZH) probably enjoys more widespread use than any other Amiga virus-detection program at this time. Installing John Veldthuis' acclaimed program under AmigaDOS 2.04 requires nothing more than dropping it into your WBStartup drawer.

Safety in Numbers

Many of the people who develop virus combantants belong to the nonprofit organization Safe Hex International. The Denmark-based group was established by Amiga user and virus researcher Erik Loevendahl Soerensen. Now, with 14 centers worldwide (including one in Florida), SHI serves all computer platforms. The group claims the dubious honor of having amassed the world's largest collection of viruses (over 275), which it analyzes to update its arsenal. SHI wants to help recover the losses of people who are out substantial sums because of viruses, even offering a $1000 reward for information leading to the conviction of virus programmers.

You can get Safe Hex's latest version of The New SuperKillers from the US Regional Virus Center—either by downloading it from the BBS (813/849-4034) or by sending $3 per disk (a 12-disk subscription is $35) to PO Box 724, Port Richey, FL 34673.

You can never be completely safe from viruses, for new ones are continually being developed and old ones reworked. Let's give hearty thanks, though, to the people who contribute to protecting us all.

Here are the addresses and telephone numbers of the networks mentioned above:

BIX
General Videotext Corp.
1030 Massachusetts Ave.
Cambridge, MA 02138
800/227-2983
617/354-4137

CompuServe
PO Box 20212
Columbus, OH 43220
614/457-0802
800/848-8199

GEnie
401 North Washington St.
Rockville, MD 20850
800/638-9636

Portal Communications
20863 Stevens Creek Blvd.
Suite #200
Cupertino, CA 95014
408/973-9111 □

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★ NEW: Software Programmable Volume Control
★ NEW: Software Controllable Filter

With the most powerful, comprehensive 8-bit Digital Sound Package to ever orchestrate an Amiga

Digital Sound Studio

The Affordable Answer to Your Audio Dreams

Record, Edit, Compose . . .

With a high-quality stereo sound sampler, A fast, powerful, easy-to-use sound editor, And a self-contained 4-track sequencer.

For all the sound effects and music you could ever imagine.

▶ **Record** sound samples from any source, including voices, noise, and pre-recorded instruments, to create your own instruments and effects.

▶ **Edit** sounds quickly in real time. Add effects like reverb and echo, run sounds backward, alter wave forms, cut and paste sound segments, create loops, eliminate pops and scratches.

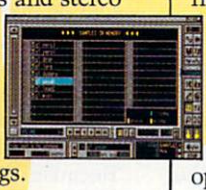
▶ **Compose** easily using the DSS 4-track sequencer and your Amiga or MIDI keyboard. Draw from up to 31 instruments at a time, in up to four octaves with 8 different variable effects. Mix and modify sounds in real time as you compose, through direct interface with the sound editor.

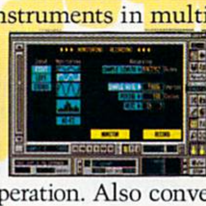
DSS Stretches the outer limits of 8-bit sound

- Create your own 4-track, self-playing musical compositions.
- Make soundtracks for home video, animation or visual presentations complete with voice-over, sound effects and music.
- Analyze voice patterns and stereo separation.
- Analyze graphic equalization of real-time sound.
- Remove "pops" from old phonograph recordings.
- Create custom instruments and sound effects by collecting and/or modifying pre-recorded instruments, voice, or sounds from any source, and use them in your own compositions.
- Save your sound and music to disk or send it out via modem for replay on any Amiga.

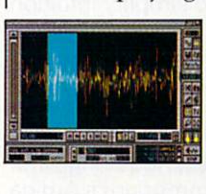
Check out these unparalleled features

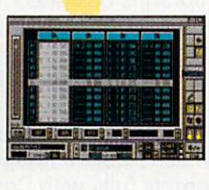
✓ AmigaDOS 2.0 compatible; written in assembly language.
✓ Multi-tasking operation.
✓ 68020 and 68030 compatible.
✓ Comprehensive tutorial manual helps even beginners get started right away.
✓ Intuition-based graphic interface makes operation easy.
✓ MIDI-in capability.
✓ Direct interface between sequencer and editor.
✓ Hold 31 sound samples in memory at once – all shown on screen so they are easy to manipulate.
✓ Effects and processing capabilities include echo, mix, filter, re-sample, sound data inversion, playing sounds backwards, loops, fade-in/fade-out and more.
✓ Manipulate sound samples in real time, as you listen.
✓ Create sampled instruments with 1, 3 and 5 octaves.
✓ HIFI recording for highest quality playback.
✓ Controls for faster/slower playback and filtering high frequencies during playback.
✓ Load and save samples, songs and instruments in multiple formats.





✓ Multiple effects for each note.
✓ Stereo and monophonic operation. Also convert mono to stereo or separate stereo.
✓ Auto-playing music modules.





✓ Real-time oscilloscope and spectrum analysis.
✓ Real-time reverberation.
✓ Graphic editing of wave forms through easy-to-use functions, including zoom in/out and precision controls for position, frequency and amplitude.
✓ Draw sound waves freehand using the mouse.
✓ Direct editing of individual sample numeric values.
✓ Maximum recording speed of 51,000 samples/second (38,908 samples/second in stereo).
✓ Savable Preference settings.
✓ Saves in IFF, SONIX or RAW formats.
✓ Compatible with SoundTracker, NoiseTracker and SoundFX modules.

DSS 8

DIGITAL SOUND STUDIO



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Dealers Circle 155 on Reader Service card. **Consumers** Circle 156 on Reader Service card.

video—or two video sources—with **ChromaKey+** (***MicroSearch***, $395). New to this version of the chromakeyer are a higher video bandwidth, video filter, and separate chroma input for cleaner edges. By using the linear-key signal, you can control ChromaKey+ from the Video Toaster's interface. (RS# 103.)

Two if by CeBIT, from p. 8.

hard drive). The machines look similar to A500s, but, lacking a numeric keypad, are over five inches shorter. According to unofficial sources, these releases are planned as long-term replacements for the Amiga 500. Officially, Commodore did not comment on this "plan." But attendees had plenty of comments, ranging from "ugly" to "nice game machine" to "great." *(Editor's note: As of press time, there is no definite release date for America. We hear that FCC approval is pending.)*

The machine incorporates SMD (Surface Mounted Device) technology, meaning that only its ROM is replaceable. This design divided Amiga hardware manufacturers into two groups: Those fearing that the approaches used for A500 boards will not work with the new machine, and those who got excited thinking of the money they could make repairing a machine that disallows modification at home. German manufacturer ***Golem Computers*** announced the first **68030 board** for the Amiga 600.

Also on the stand was the Amiga's predecessor, the best-selling **C-64**. Before you laugh, be aware that with the opening of the iron curtain, this machine is more popular today than ever before. Commodore sold more than 800,000 in 1991 (the highest number ever in one year), with most going to East European countries.

Joining these machines in the home-computer booth was **Scala 500**. This lower-priced version, designed for A500 users, lacks an ANIM player. ***Electronic Arts*** got an unexpected response from its **DeluxePaint IV** demo when people asked for a version to work with advanced processors.

Developer/distributor ***FSE*** showed a hard drive and a new **50-Mhz 68030 accelerator** by Golem, and it announced a **RAM expander** for the A600, as well as a **16-bit sound sampler** for the A2000 and A3000. ***Casio*** presented an Amiga **interface** for its portable Databank machines, and ***Philips*** offered a **CD-production system** for under $10,000 that can write any CD format, including CDTV and audio CD.

Still, surrounded by PC, UNIX, and workstation companies, Amiga users felt somewhat lost at CeBIT. It was hard to find Amiga companies among the thousands of exhibitors, and no company showed only Amiga products.

No Respect

The so-called "Amiga freaks" do not improve the Amiga's image. They run around at fairs by the hundreds, exchanging pirated software, phone numbers, and addresses. Their annual CeBIT opening-day procedure is to cover the wall next to Commodore's stand with stickers, graffiti, and addresses of "spreaders." That night, Commodore has the wall repainted, and from then on guards stand watch to prevent a repeat performance.

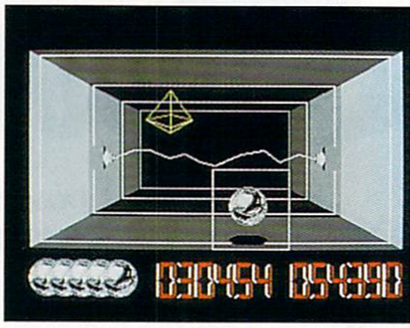
This is not the kind of behavior that gets the Amiga the recognition it deserves. But neither is Commodore's emphasis on PCs. While other companies proudly announce initial steps into multimedia, the first and true multimedia machine is being overlooked.

—*Alexander Horn*

Simplified Intuition

If you find Intuition programming time-consuming and confusing, consider **STSLib** (***SciTech Software***, £20) and **Instinct** (***Advanced Thinkware Designs***, $249.95). STSLib promises simple access to 2.0-look menus and 3-D gadgets under AmigaDOS 2.0 and 1.3. An alternative to gadtools.library, STSLib offers routines for Boolean, text, cycle, check-button, and radio-button gadgets, menu building, window and requester creation, IntuiText structures, pen selection, drawing, and more. (RS# 113.)

Instinct is a collection of object-oriented libraries designed to simplify Intuition programming and provide user-interface primitives that exceed those of Intuition. For example, field objects provide standard gadgets, plus such bonuses as scrolling lists, pop-up fields, subforms, matrix fields, and variable-length, multiline text. Trigger objects allow user actions to launch events: A menu selection could summon a requester, or a gadget click could open a window. Image objects support IFF-ILBM data so you can use brushes to define images. Requiring AmigaDOS 2.0, Instinct promises results that comply fully with Commodore's Amiga User Interface Style Guide. (RS# 114.)



Let there be the Light Corridor!

Isn't That Spacial!

The eight-member crew of the space station Pegasus is being killed one by one in **Murders in Space** (***Titus***). To solve this mystery (and preserve your own life), you must fly a space shuttle, conduct complex medical experiments, explore outside the space station, and, of course, master the zero-gravity environment.

Titus' 3-D puzzle **The Light Corridor** is a different space challenge. Here, you travel at the speed of light, ensuring the safe passage of chosen objects through the tunnels of time. (RS# 105.)

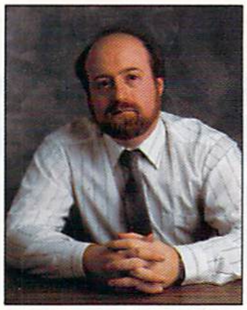
Broadcast Boost

Caligari Broadcast 2.1 (***Octree Software***, $1995) ups the ante in 3-D modeling. This lastest version of the ray tracer includes a free-form deformation module; revamped point-editing, slice, sweep, and mirror functions; quaternion-based spline animations; an unlimited number of lights; and a 32-bit (eight-bit alpha) renderer with texture mapping, environment mapping, shadows, four-level antialiasing, and transparency, Gouraud, Phong, metal, and environment shading.

For input and output, you can choose among VideoScape, LightWave, and Sculpt object formats. Broadcast 2.1 also supports single-frame controllers and the Targa+/Vista, Impact Vision 24, Harlequin, DCTV, and HAM-E frame buffers. For slide making, resolutions of up to 8000×8000 pixels are at your disposal.

Because this type of 3-D power requires intense calculation, the program is optimized to run on 68030 and 68040 accelerators with floating-point units. (RS# 109.)

Overscan is compiled by Barbara Gefvert, Linda Laflamme and Tim Walsh. Send your news, new products, and network information to Overscan, *AmigaWorld* Editorial, 80 Elm St., Peterborough, NH 03458. ■



HELP KEY

Lou deals with creating a RAM disk, explains what fatter Agnus does to RAM, and recommends an adapter.

By Louis R. Wallace

Agnus Chip Effects

Q: *On my A500 I have one megabyte of RAM and the fatter Agnus chip. The way I understand it is that I now have essentially two megabytes of RAM (one meg of chip RAM and one meg of fast RAM). Now, if that is correct, then why does Diskmaster say I have only 800K of RAM free? For that matter, it says I have 800K of chip RAM and no fast RAM! What's going on here?*

R. Nadon
Canada

A: Diskmaster is correct—that is all the RAM you have. When you had the new Agnus installed, this increased your chip RAM from 512K to one megabyte. The extra 512K of new chip RAM was originally your 512K of fast RAM. Now you have one megabyte of chip RAM, but no fast memory. Keep in mind that the Agnus merely allows more chip memory; it doesn't have any RAM of its own. In order to have fast RAM, you will now have to add some extra expansion memory.

GVP's VIU Adapter

Q: *I recently bought the GVP IV24 video card. It's great, but I really need a good composite-to-RGB adapter so I can make use of some of the neat features like the PIP (picture in picture) option. Where can I find one?*

L. Williams
New York, New York

A: You're in luck! Great Valley Products recently visited the *AmigaWorld* offices and showed us some neat new products for the IV24 (among other interesting things). One was a video input/output box for the IV24 called the VIU (Video Interface Unit), which will do exactly what you need, and which will henceforth be included with every IV24 that's sold. Best of all, GVP plans on giving one to every registered IV24 owner who has already bought the IV24 but didn't get the VIU. So if you haven't already sent in that IV24 registration card, do it now! According to GVP, all you then need do is contact the dealer from whom you bought the IV24, and they will arrange to send you your new VIU.

RAM Disk Creation

Q: *Help! I am trying to create a recoverable RAM disk for my A500. I am using AmigaDOS 2.04, and I have three megabytes of RAM. I have tried several things, but just can't get it to work. Can you help?*

J. Turner
Tampa, Florida

A: The recoverable RAM disk, or RAD: device is quite easy to create and use. Just add the following lines (if they are not there already) to your mountlist. (The mountlist is found in your SYS: DEVS drawer, and can be edited with any text editor that can load and save ASCII. Remember, if you use your word processor, make sure it saves the file back as text only!) These lines will create a mountlist entry for a recoverable RAM disk that has the storage capacity of a standard floppy disk.

```
/* This is an example of a mountlist entry for
using the recoverable RAM disk. You can alter
the amount of memory you wish to devote to it
by changing the HighCyl value.*/

RAD:
   Device = RAMdrive.device
   Unit = 0
   Flags = 0
   Surfaces = 2
   BlocksPerTrack = 11
   Reserved = 2
   Interleave = 0
   LowCyl = 0
   HighCyl = 79
   Buffers = 5
   BufMemType = 1
```

Once you have added these lines to your mountlist, you should then edit your startup-sequence to check for the existence of RAD: and install it if it isn't already present. If RAD: is present, your startup-sequence should do nothing, but if it isn't already present, it should be mounted, formatted and have the appropriate files copied to it. Here is an example for your startup-sequence.

```
mount rad:
if not exists rad:trashcan
   echo "Formatting RAD:..."
   run >nil: sys:system/format drive RAD: name
      Rambo
   echo "Now copying DF0 to RAD..."
   copy DF0: to RAD: all quiet
   echo "RAD Ready!"
endif
```

This sequence does a couple of interesting things. First, it mounts the RAD disk. (On subsequent reboots, this line will generate a message that RAD already exists.) Then it checks for the existence of the Trashcan directory in RAD. If that isn't found, it assumes this is the initial powerup of the system. It then quietly formats the RAD disk, (which creates the Trashcan drawer). Next, it copies over all the contents of DF0: to the recoverable RAM disk, using the regular file-copy command. At this point, you will have a RAM disk whose contents will survive a warm reboot of the machine.

You can modify this in many ways. For example, if you don't want all of DF0: copied, just delete that line and add specific copy statements to do the files and directories you need. Or, you could change the source directory from DF0: to another drive like DF1: or DF2:. Keep in mind that the mountlist entry above creates a RAM disk the same size as a regular floppy, and it will fill up and generate a "disk full" message if you try to put too much into it. If you need more room, increase the value for HighCyl in the mountlist. However, using a recoverable RAM disk the same size as a floppy has advantages, such as the ability to do a disk copy between it and real floppy drives. ■

THE ONLY 16Mhz '286 IBM PC/AT® EMULATOR THAT WORKS WITH BOTH THE A500 AND THE A2000



If you want your Amiga 500, 500+ or 2000 to be able to run software programs that were originally written for the IBM PC, GVP and Vortex have the perfect solution—the ATonce-Plus PC/AT emulator board.

But before you buy any emulator here are a few key facts you should know . . .

- **FACT:** ATonce-PLUS is the only PC emulator board with a powerful 16-bit 80286 CPU running at the blazing clockspeed of 16Mhz.
- **FACT:** ATonce-PLUS has a Norton Speed Index of 16, so you know it's amazingly fast at loading, manipulating and storing data.
- **FACT:** ATonce-PLUS comes with its own 512KB of RAM and allows the Amiga's memory to be (transparently) allocated to MS-DOS applications requiring more than 512KB of memory. Amiga FAST RAM can even be used as extended memory!
- **FACT:** ATonce-PLUS can take full advantage of the 80286 CPU's protected mode and allows MS Windows to run in "standard" mode. This is not possible with other emulators using 8-bit wide bus CPU's.
- **FACT:** ATonce-PLUS operates under AmigaDOS, so you can run AmigaDOS and MS-DOS applications concurrently!
- **FACT:** ATonce-PLUS supports Hercules, CGA, EGA/VGA (monochrome), AT&T 6300 (640x400) and T3100 video emulations.
- **FACT:** ATonce-PLUS makes 1000's of new software programs available to Amiga 500, 500+ and 2000 users.
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REVIE

SuperJAM!

The Blue Ribbon SoundWorks

A ghost virtuoso.

By Rick Manasa

WHETHER YOU'RE A novice or professional, **SuperJAM!** (***The Blue Ribbon Soundworks***, $149) promises to provide you with the tools and means to compose music in a variety of styles easily and creatively. How? By letting you input chords, keys, tempos, and styles and then "filling in the blanks" by playing an appropriate part based on the outline you created. It's kind of like telling your life story to a ghost writer and having him whip together a stunning literary masterpiece based on the facts you provided. SuperJAM! is an achievement no less remarkable.

The Warm-Up Act

The noncopy-protected program comes on three disks and is easily installable on a hard drive. All the Amiga-specific features are there, embraced in the wacky Toon Town interface we've come to expect from Blue Ribbon. Moreover, SuperJAM! is quite compatible with other programs. It integrates smoothly with Bars&Pipes Professional, so you can add a drum track created with SuperJAM! to the rest of the tracks you developed in B&P Pro.

The program has a fully implemented ARexx port and will synchronize to SMPTE via MIDI time code directly or through Dr. T's Phantom synchronizer. You can even synchronize your Imagine- and Real-3D-created animations. Finally, you can save your creation as a SMUS file or standard MIDI file, which allows you to import the work into any Amiga sequencer that supports these formats (most do by now).

While SuperJAM! supports 24, 25, 30, and 30-drop frames per second, you can't insert hit points or sync different passages of music to different film or video scenes. Because Bars&Pipes Professional treats SuperJAM! as an accessory and imports its files, you can take advantage of B&P Pro's timeline editing to create a hit list to match your video.

While the program can use the Amiga's internal sounds and does not require any extra hardware to play back songs, it also supports MIDI instruments. You supply the MIDI interface and instruments, and SuperJAM! supplies a set of default synth setups to load, including Roland MT-32, Proteus 1, and Ensoniq SQ-1. SuperJAM! knows how each of these instruments is laid out and displays the factory presets' names when loading sounds.

Blue Ribbon recommends that the more serious SuperJAM! users employ MIDI technology, because of the higher fidelity and reduced stress on the processors. While I agree, I wouldn't dismiss the company's TurboSound Technology until you've heard it (more on this later). You may find it adequate for your game development, music demo, or multimedia work.

SuperJAM! makes efficient use of the menu bar. The menus change with each activated window. The Song window, for example, offers a different set of menu items than does the Chords window. This keeps the menu bar from appearing too formidable to the novice, while still maintaining the program's capabilities for more experienced users.

There are so many levels to SuperJAM!, however, that you can easily get lost. To prevent this, the title bar of each window displays its parent and complete path. If you're not careful, you can run out of memory in opening windows, even with a multimegabyte system. That's why having the duplication of tools in many windows is so helpful. You don't have to hunt through layers of windows to find any tool you might need in the current window.

For information about the vendors of products reviewed, see the "Manufacturers'/Distributors' Addresses" list on p. 102.

The easy-to-follow manual is also a great help in navigating the program. After it describes the installation procedures, it takes you on a quick walk around the SuperJAM! screen and conventions, and then jumps into music making with a tutorial. The tutorial chapter shows you how to select and change the style, chords, tempo, and key criteria for your music. SuperJAM! ships with numerous style and chord selections to choose from, so getting started immediately is no problem. Many of the icons are explored and explained as well.

Whether you want to or not, you'll learn a bit of music theory and style with SuperJAM!. Fear not; it's relatively painless. By the time you're through with the tutorial, you'll have been exposed to some of the basic ideas of SuperJAM! and to many fundamental music composition concepts, as well.

The Headliner

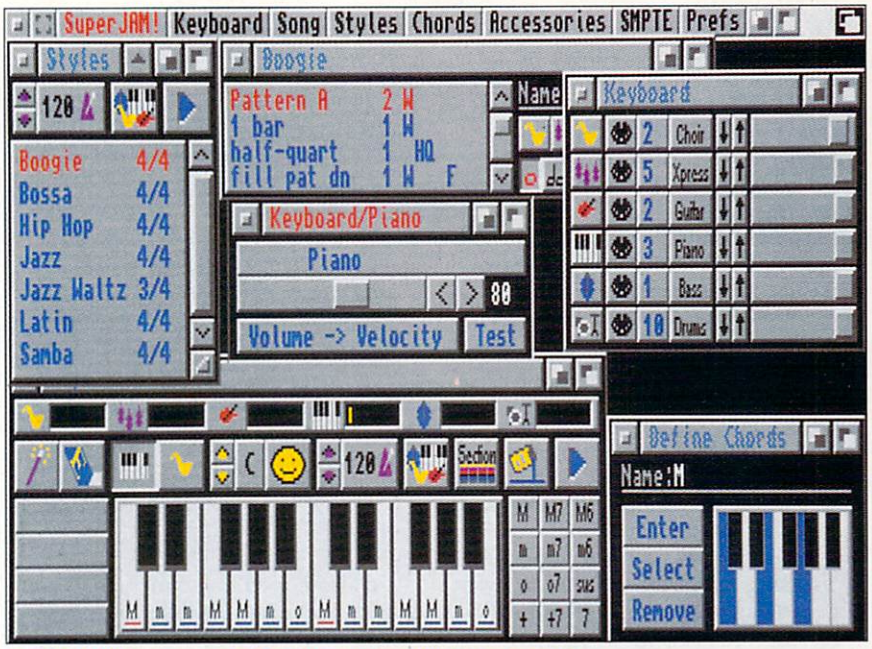
Once you've learned the basics, it's time to meet the band: the drummer, bassist, keyboard player, guitarist, string section, and lead player, although any player can be assigned any instrument. You can set each player's volume, octave, and instrument. When necessary, you can also select the MIDI channel. That there are only six instruments available may seem a severe limitation, but remember that SuperJAM! is not a sequencer. As an algorithmic composer, SuperJAM!'s primary purpose is generating and manipulating styles and changes.

The Section Window allows you to set parameters for SuperJAM! to follow in its performance. Here you design your sections of the song by defining such items as the chord and style changes within which SuperJAM! will improvise. You can turn the program loose or take a Snapshot of a performance you particularly like. SuperJAM!

repeats a Snapshot verbatim, just like a traditional sequencer.

Also as in a sequencer, you can massage any note's time, velocity, or duration, and even add and delete notes. Defining and entering chords, muting portions of the section, adding embellishments, and even changing the band are all possible. Finally, you can link your sections into a verse-chorus-bridge arrangement in the Song window to create your finished piece.

While the chords included in SuperJAM! cover a wide range, they are far from complete; hence the Define Chords window. Here you create new chords by clicking on notes in a one-octave keyboard. This is the greatest weakness of the window: Many chords just don't sound right unless they're spread over a few octaves. Clustering CEGAB^{b} into one octave may technically be a C13th, but Oscar Peterson wouldn't play it that way.



SuperJAM! turns your inspirations into stylish compositions.

The Back-up Band

One of the biggest buzzes surrounding SuperJAM! is Blue Ribbon's TurboSound Technology, which mixes any number of instruments and plays the mix over one Amiga channel. The advantage is that you can have many more than the Amiga-standard four different instruments playing simultaneously. The disadvantage is that TurboSound Technology uses a lot of memory.

Here's how it works: The IFF sound format calls for one sample per octave, leaving it to the Amiga sound chip to alter the sample's pitch to generate the different notes of the octave. Because TurboSound premixes the instruments, the Amiga can't shift each instrument individually. Therefore, TurboSound Technology must take a sample for each note, instead of for each octave.

You can convert your favorite IFF samples into TurboSounds with the included TurboSound Editor, a full-featured sample editor similar to Audition 4 (SunRize Industries) and AudioMaster IV (Oxxi). The included TurboSound library is so extensive, however, that you may never need to look elsewhere for sounds.

Yet another aspect of TurboSound Technology is the TurboSample, a snapshot of your entire SuperJAM! composition. This is very useful in low-memory situations, for once it's created, it requires nothing from your system. What's more, you can play a TurboSample directly from disk using the included stand-alone TurboPlayer. You can even pack up to three minutes of music on a disk in lo-res mode. All this, folks, and ARexx control of TurboPlayer, too.

While TurboSound Technology can't compete with even a basic MIDI setup, you can't deny the amount of effort that's gone into its design and execution. The capability and potential of SuperJAM! just seem to expand the further you get into the program.

On the MIDI side, you can select patches from your favorite synth, set the MIDI channel and volume, map velocity to volume for those older synths that don't support MIDI controller #7, set up drum maps, and save your configurations to disk. SuperJAM! provides patch lists from some popular synths, or you can create your own.

To help you produce results worth listening to with these tools, three chapters in the manual are solely devoted to style considerations, and rightly so. The use and control of style may be the key element to SuperJAM!. The program comes with a wide variety of styles—Rock, Hip Hop, Waltzes, New Orleans Jazz, Samba, and Motown (my favorite) among others—that you can edit to suit your tastes or use right out of the box. (Pop/Rock, Classical, and Cutting Edge style disks are available from Blue Ribbon for $24.95 each, as well.)

The style chapters deal with a brief introduction to the elements of style, the process of analyzing a selected style to find out what makes it tick, and, finally, the development of your own style. Some of the concepts are involved, but they are clearly explained. Blue Ribbon is to be commended for removing the mystery behind the process and giving the user the tools, insight and instruction needed to be creative on his own.

Back to the Studio

So how can SuperJAM! be improved? Lots of ways. First of all, give it an Undo Last Action key; it's too easy to do destructive editing without this type of safety net. Also, an auto-backup function would help you stay focused on the creative process. And the manual should mention that there are hot keys for many functions in SuperJAM! Currently, you have to stumble on these yourself. Further, the ability to export in SMUS or MIDI files is great, but it would be even better if you could import patterns and sequences into SuperJAM! that you've created in your sequencing software.

SuperJAM!'s patch scroller and chord selector are especially unnerving. It is too easy to select them by ►

mistake. Once you do, you must choose a patch or chord or else move the cursor completely off the window before releasing the mouse button. A standard file requester would be much better. Speaking of requesters, the SuperJAM! Load File requesters have an unusual arrangement of the Load and Cancel buttons that can wreak havoc if you're not careful. SuperJAM! puts a Delete button where you would normally expect to find the Load button, and gangs the Load and Cancel buttons on the right. (Why you need a Delete option in a Load requester at all is beyond me.)

The Keyboard window of the program could use a metronome. It's often difficult to tell where the downbeat is by listening to SuperJAM! wailing away. On a similar note, the program can't make real-time changes happen in time. For example, if you change a style on the downbeat, it takes quite a few ticks of the clock for the change to register. While there is a Countdown feature in the Section window, there is none in the Snapshot grid, where you could really use it for overdubs.



YOUR TURN!

SuperJAM! is extremely user friendly, and works great with Bars&Pipes. I wish, however, the manual provided more information on other MIDI interfaces you can use. The TurboSounds sound good and are very helpful, especially considering that you can make your own sounds with them. Overall, SuperJAM! is an excellent product that helps me out a lot.

Troy Sterling Nies
Mandan, North Dakota

I'd also hoped for some better examples of TurboSounds than those provided. They're thin and a bit cheesy, like a Nintendo game. Considering some of the awesome sounds we've heard come out of the Amiga, I'm puzzled that Blue Ribbon banged the drum loudly about TurboSound Technology and then provided such anemic examples. I found standard IFF sounds to be much richer and more lifelike than their TurboSound cousins. Neither were there any clear examples of the claimed 16-note polyphony. I'd think that a song demonstrating this aspect of TurboSound Technology would be almost required to illustrate and document the hype.

Chart Topper

Tapping the full potential of SuperJAM! will take you some time, but you'll find the results well worth the effort. It doesn't work like a traditional sequencer, so you'll have to think differently about recording than you're probably used to. Good! Creativity can be sparked by approaching old thought systems in new ways. If things get overwhelming, a call to Blue Ribbon tech support will set you straight. Be sure to send in your registration card so you can take full advantage of this service. The staff knows the products and always takes the time to explain things thoroughly and walk you through any difficulty.

While it won't write music for you, SuperJAM! goes a long way toward making the creative process accessible ►

to all. Is SuperJAM! a tool deserving of consideration by a professional? Absolutely. Is it fun? You betcha. It serves the multimedia artist and musician alike as a way to get quick, polished results with a minimum of effort. SuperJAM! is a worthwhile product, full of tantalizing possibilities that should only get better. With a little more work and some fine tuning, SuperJAM! could become a bridge of dreams between modest musical skills and truly professional output.

Wordsworth

Digita International

A new British bard.

By Dave Johnson

NOT SINCE THE Amiga's early days have we seen the arrival of so many new word processors, and while some are arguably little better than a manual typewriter, many have carved a useful niche in the marketplace.

Wordsworth (***Digita International/ American Software Distributers***, $159.95) falls into the latter category. It is a fairly traditional graphic word processor, opening a familiar-looking ruled window and sporting all of the expected tools: multiple fonts and text styles, IFF graphic support, headers and footers, a spelling checker, and a thesaurus, just to name a few.

More Than a Smith Corona

From there, Wordsworth breaks from the norm with a few new tricks of its own. One of the more interesting features is Glossary, a database of user-defined phrases, words, and blocks of text that you use frequently. You can search through them and insert any one into a document at the touch of the mouse, saving untold keystrokes. To save you the time and frustration of flipping through a manual, Wordsworth offers a nifty on-line Help feature (accessible via the Help key, of all things) with assistance on most of the program's features. In addition, the Help text includes page-number references to the nearly 300-page, well-written manual for more in-depth investigation.

Have you ever wished for a vertical ruler on your word processor to complement the obligatory horizontal one? Wordsworth includes one that you can, of course, turn off for more screen space. In addition, you can display a handy tool box that controls, among other things, text format, font type, and text color. It also provides access to such tools as Undo, Again (shades of DigiPaint 3), and Help without going all the way to a menu. Drag bars on both the side and bottom of the screen ►

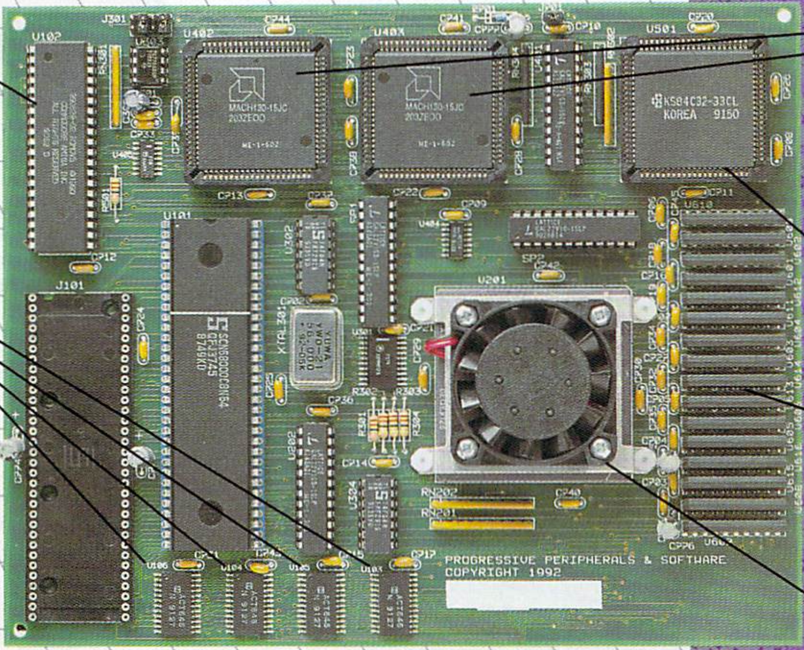


YOUR TURN!

Wordsworth's presentation, printing, saving, spelling checker, thesaurus, and help options are all that one could ask. My only two concerns are the program's speed and memory usage. With one meg, Wordsworth is very limited; everything else needs to be shut down, as few colors as possible used, and no more than two documents open at once. I put an extra two megs in my A2000, and I can now do as I please. If Digita could increase the speed, Wordsworth would be the best available word processor by far.

Greg Malcangi
West London, England

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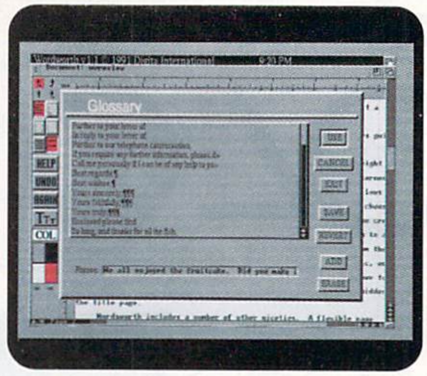
Circle 150 on Reader Service card.

allow you to move around the page, but with both the vertical ruler and tool box turned on, Wordsworth quickly gets claustrophobic.

The spelling checker works by the word or entire document and seems fairly efficient. The program betrayed its British roots, however, when the spelling checker flagged "color" as a misspelling and suggested "colour" instead. I was particularly impressed with how quickly it worked, though. Rather than wait for you to click on a Suggest gadget, Wordsworth lists possible alternatives as soon as it detects a misspelling.

The thesaurus, although large, labels only 30,000 of its entries as root words. This places the program at a distinct disadvantage compared to, say, ProWrite's thesaurus, which crosslinks all of the words in its database. On the other hand, Wordsworth lists its entries by parts of speech, making it a rather simple task to find the word you're searching for.

When it comes to formatting your document, two major requesters guide the way: Page Layout and Paragraph. The Page Layout, or document, requester is used primarily to set up paper size, header/footer height, and global margins. The Paragraph requester handles such issues as line spacing and paragraph indents. Wordsworth even allows you to configure each paragraph in the document differently, if you so choose.



Wordsworth's Glossary provides fast access to common phrases.

Wordsworth includes a number of other niceties, as well. Selecting a graphic to place in the document leads you to a selector for text runaround, palette controls, and text standoff from the graphic. Text may be set to contour around either side of a graphic or just drop vertically. Headers and footers do not have to be identical on odd and even pages and may appear or be hidden on the title page. A flexible page-preview function lets you know what the document looks like before you commit to the hard copy.

You'll also find mail-merge facilities; import/export options, including ASCII, WordPerfect, and ProWrite format; and an "insert literal" utility that lets you pick specific characters from a font set. You'll appreciate this feature the next time you want to insert the Symbols font's little airplane into a letter, but can't remember which key it is hiding in. Digita also includes its own screen blanker and a tiles-type of game under the catch-all menu entitled Wordsworth.

If you desire, the program can perform automatic timed backups in user-specified time increments. If you like the security of having backups of your last-saved version, Wordsworth can also accommodate you here by making a .bak copy of your document before saving newer versions.

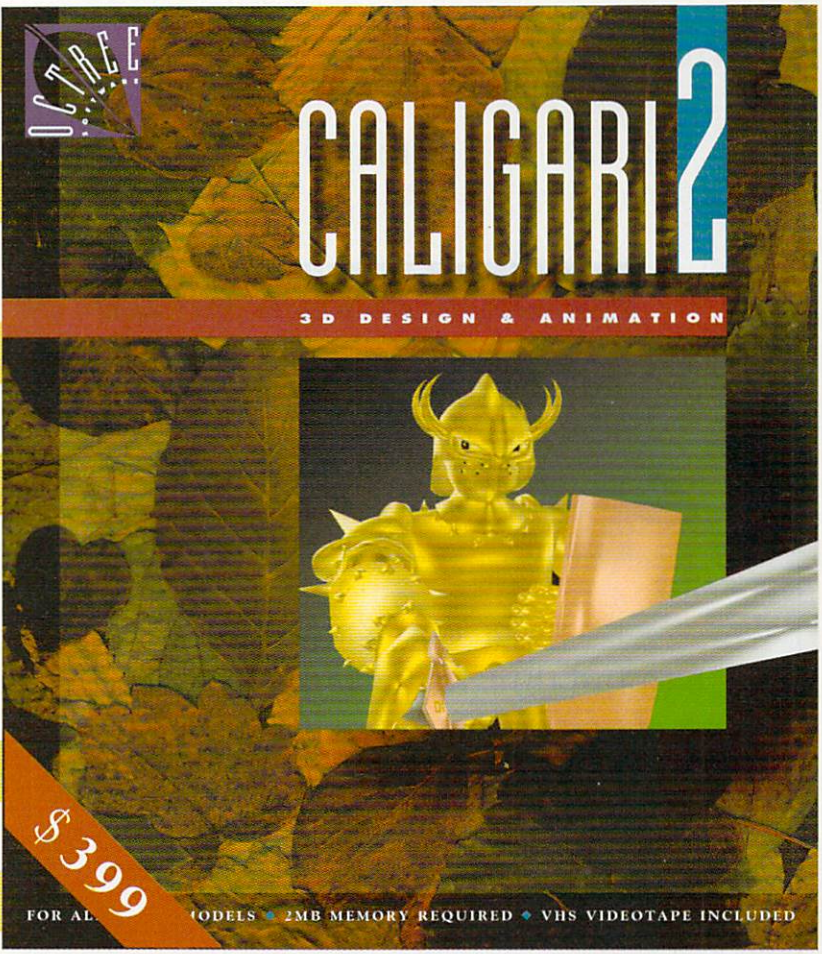
What else can Wordsworth do? It supports auto-hyphenation, can speak your entire document or speak as you type, and can display paragraph sym- ►

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bols if you like to keep visual track of that sort of thing.

Looks Good on Paper

These days, it seems as though every developer has its own proprietary printing routines for wringing higher-quality output from the printer, and Wordsworth is no exception. In addition to supporting normal Amiga system fonts and AmigaDOS 2.0 outline fonts (quite nicely, I might add), Digita throws in UltraPrint, a takeoff on the old Macintosh print method of scaling down a four-times oversampled font for higher on-paper quality.

To use UltraPrint, of course, you must have a font that is four times larger than the one you are using on-screen; if you type with 12-point Times, you must have 48-point Times on disk for UltraPrint to work its magic. You can achieve a somewhat more modest effect with a double-size font. Digita includes four UltraPrint fonts with the program, one of which is a symbols-type font.

While printing isn't lightning fast by any stretch of the imagination, the final product is quite nice when the paper does eventually roll out of your printer. Continuing another recent trend in word processors, Wordsworth includes a PostScript driver. If you are outputting to a PostScript machine, the program allows you to render at any angle and to scale the page from 5 to 500 percent.

There isn't a lot that one can find to dislike about Wordsworth, but a few things do stick out. Even in high-resolution, the screen can easily feel a bit cramped, as the title bars stay "medium-resolution fat" and hog up a significant amount of workspace—and that's without the toolbox on! Conspicuously missing is macro support, and Digita doesn't bring us any index-generation capabilities, either. Finally, I happen to dislike gimmicks in my productivity software, so I found the tiles game to be a waste of bytes. The Amiga is, after all, a multitasking machine: If I want to play a game, I can just push Wordsworth to the back and boot up Lode Runner.

An intermediate, fluid-working word processor, Wordsworth isn't the leader of the pack for the Amiga, but make no mistake—it's no slouch, either. If you're looking for a program with a little muscle for business or free-lance writing, Wordsworth is certainly up to the challenge, but if you need turbo-charged typing power to pound out a mega-volume of pastoral poetry, it might not be your program. Give Wordsworth a test type and decide for yourself.

RayDance

Radiance Software

Scripted 3-D rendering and animation.

By David T. McClellan

THE AMIGA HAS seen its share of ray tracers, both public domain and commercial. Centaur's Sculpt-Animate 4D, Impulse's Imagine, and NewTek's LightWave 3D model and create beautiful stills and—with some work—animations at a reasonable speed. New on

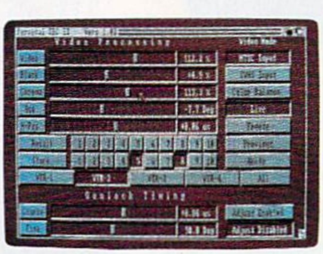
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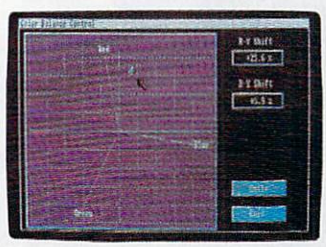


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A500 EXPANSION:

THE "INSIDE" STORY

Want to keep all your A500 expansion peripherals under cover? Here's a look at the key "insiders," information on how they work together, and strategies for expanding internally.

BY TIM WALSH

WHILE THE A500 was not built to expand as gracefully as the A2000 or 3000, third-party developers offer resourceful options for those who like to keep things "under cover." Now, you can find an internal solution for several types of expansion.

There is a catch, though. Upgrading the Amiga 500 internally poses a decision-making process that makes a Democratic primary ticket choice look easy. That's because incorporating one internal modification often eliminates the possibility of doing some other internal tweaking when different types of expanders require the same connector. Theoretically, you can piggyback components, but you are unlikely to get stacked components to operate, and even less likely to be able to fit the RF shielding and cover back onto the computer with parts piled high inside.

Before making final decisions, you may want to call the product's manufacturer and ask about compatibility with other components you already have and with your motherboard revision. (For a look at the innards of the A500 and where the various expanders install, see the photo on p. 30.)

Because A500 expansion involves tradeoffs, it is wise to consider all your options before actually buying anything. A good place to start is by imagining your dream setup—thinking about all the things you would like to do with your computer and determining what you need in order to do them. Then ask yourself what you are willing to live without.

Once you have thus prioritized your plans, consider your total "power budget." The Amiga 500 was not designed for extensive expansion, so you must take care when adding on. The A500's power can safely put out about 4.3 amps of electrical current at +5 volts. Unexpanded, a stock A500 consumes almost 2 amps. If the ►

ILLUSTRATED BY BOB SCOTT

expander you're considering has its own power supply, you need not worry, but if it does not, try to find out what its power consumption is. When you approach the 4.3 mark, think about upgrading your A500's power supply to one like ***Micro R&D***'s **Bigfoot** ($129). *(To locate the vendors of the products mentioned, see the "Manufacturers'/Distributors' Addresses" list on p. 102.)*

ROM First

The highest priority upgrade is replacing the A500's Kickstart 1.2 or 1.3 ROM chip with ***Commodore***'s **2.04 ROM** and ousting your earlier Workbench version in favor of 2.04. I encourage all A500 (and A2000) users to make the switch, even if you plan no other internal modifications. Not only will your computer function better, but 2.04's look and feel makes older operating-system versions seem clumsy and antiquated.

Installing a new Kickstart ROM is one of the easiest do-it-yourself internal modifications you can make. Available in the 2.04 AmigaDOS upgrade package from dealers, it's a small ($99.95.) investment. When you open your A500, take a moment to locate the clearly marked Kickstart ROM and note its orientation in the socket. Pop it out with either a small flat-blade screwdriver or a chip puller, position the new ROM chip just as the older chip was oriented, and press it into place. You may have to sever, as I did, an insulated wire jumper on top of the new Kickstart ROM if you have a late revision (6A or later) of the motherboard.

If you still want to be able to run 1.3 and/or 1.2 after installing your 2.04 ROM upgrade, a couple of products can help. Both **Switch-Itt** ($44.50, ***The Grapevine Group***) and **MultiStart II** ($59.95, ***DKB***) allow you to switch between ROMs. Both units fit into your Amiga's ROM socket. MultiStart provides sockets for all three ROMs; Switch-Itt accommodates two.

Hard-Driving Options

While there are several hard drives available to attach to the outside of your A500, ***ICD*** is the only manufacturer offering entire internal A500 hard-disk systems. The company incorporates versions of its tiny **AdIDE** controller—which installs between the CPU socket and the 68000 chip itself—into two complete systems for the A500 (see the review in this issue). Both drives attach to the controller via a cable that drapes across the motherboard.

The $2\frac{1}{2}$-inch **Novia** drive ($245 and up) is available in configurations of up to 85MB. It installs on the motherboard, covering both the CIA (A) and Paula chips. The full-size **Prima** drive ($397 and up) comes in capacities of up to 240MB, but its installation greatly alters your A500's configuration, as the hard disk requires the space occupied by the A500's floppy. ICD's **Shuffle Board** ($30) installs under the Gary chip and lets you boot from an external floppy with the Prima installed. ICD also sells the controller in kit form ($110), so you can build your own drive setup.

Because the AdIDE controller fits onto the CPU socket, which advanced processors also require, the internal hard-disk systems preclude 68020 and 68030 boards. However, ICD now offers a controller version

An Insider's Trade Secret

Here are five important steps I have arrived at after years of working on Amiga internals. They make handy notes to review before and during the Amiga 500 internal-upgrade process.

1. While you should not be afraid to take apart your A500, there is no shame in feeling uncomfortable about poking around inside the machine. Even with the latest shop manual in hand, I wouldn't try to to rebuild an x-ray machine.

It's far better to have an authorized dealer perform the modifications if you have doubts. And bear in mind that separating the A500's chassis voids your warranty. Therefore, it's good practice to keep the Torx T-10 screwdriver (necessary to open the case) out of reach until the warranty expires on its own.

2. Once you've taken your computer apart, you will see that all the chips and circuitry are clearly labeled. That, however, does not guarantee a successful reassembly. Be certain to mark the proper location of cables and orientation of chips before disassembling anything. While the computer is surprisingly rugged and not easily damaged, putting the wrong piece in the wrong place can be disastrous.

3. Read installation instructions carefully. Hardware manuals are accurate, but some leave "obvious" points unmentioned. If something does not make sense, call the manufacturer and ask them for an explanation of whatever steps seem to be missing.

4. If you choose to install internal components yourself, be forewarned that it requires the kind of prying, pulling, and pushing encountered in automotive repair—but without the greasy hands and on a much smaller scale.

Be sure to use the right tools. These include flat-blade, Torx T-10, and #1 Phillips screwdrivers, a chip puller, and a pair of needlenose pliers.

Always ground yourself—it's best to use a grounding wristband (available at computer stores)—before taking the computer apart, especially on cool, dry days. You must also make sure your machine is unplugged before you begin.

5. Take care when extracting chips. Gently pry each end, using a miniature flat-blade screwdriver or a chip puller. Popping out the relatively large CIA, Kickstart ROM, and 68000 chips is only moderately difficult compared with pulling smaller, less accessible chips.

Despite years of practice, I occasionally manage to mangle pins on chips. If you bend a pin or two, a pair of needlenose pliers and steady hands are all that's needed to straighten them. Experience has taught me that most pins withstand about three or four really savage bends and corresponding straightenings before they snap off and render the chip unusable.

6. Before reassembling your computer and starting it up, check all your connections to make sure there is no board-to-board or board-to-anything contact—unless you're in the mood for some colorful (and expensive!) sparks and arcs. They are a sure sign you connected something wrong. *—TW* □

with the firm's tiny AdSpeed accelerator attached, so some acceleration is still possible.

Spirit Technology's brand-new **In-Mate** ($379 unpopulated) board offers internal RAM expansion (up to 8MB), a custom-designed 68000, and a socket for a coprocessor (speeding math-intensive work), along with a SCSI interface that lets you connect with a SCSI hard drive. (The slightly faster SCSI standard is more common than IDE in the Amiga realm, though drives are plentiful for both.) In-Mate plugs onto the CPU, measures about 6½×8 inches, and has no CPU socket. Spirit promises full 2.04 compatibility in its upcoming revision.

While a hard disk gives you greater speed in loading programs and data stored there, adding a CPU accelerator is the only way to make your Amiga 500 actually execute programs faster. Unlike the A2000 and A3000, the A500 lacks an accelerator slot, so to install an accelerator in the A500, you must disassemble the computer, pry out the 68000 processor chip, and place the accelerator board in its socket.

There are a number of accelerators for the A500. (For details on accelerators, see "The 'Ami 500'" p. 38, April '91.) These include ***ICD***'s **AdSpeed** 68000 accelerator(available for $209 without an ICD hard-drive system), as well as ***TTR***'s **Sapphire** ($249.95) and ***CSA***'s **Midget Racer** ($255), both 68020 processors. (All three offer similar speed boosts, although the AdSpeed does not accommodate a math coprocessor.)

CSA's **Mega-Midget Racer** ($599 and up) and ***MicroBotics***' new **VXL*30** ($399 and up) are high-performance powerhouses, both offering 68030 CPUs and 68882 math chips, 32-bit RAM options, and performance results commonly associated with a 25-MHz A3000. These two boards are roughly the same size as the In-Mate. Each comes with legs that fit between the board and the Amiga's CPU socket, lifting the card just enough to safely clear low-profile expanders—such as a ROM switcher, ICD's Flicker Free Video, or DKB's MegAChip—beneath it.

Internal Medicine

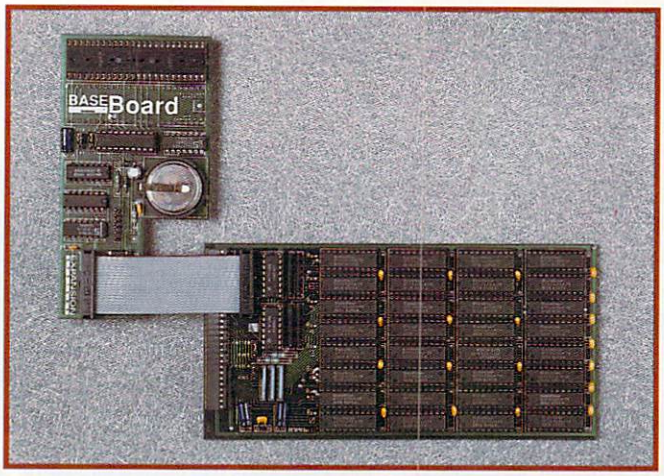
For many of us, running MS-DOS applications equates to ingesting horrible-tasting medicine. Nevertheless, MS-DOS software is here to stay, and IBM emulation can be a very handy prospect. Of the three MS-DOS emulators for the A500, two fit inside the case. (GVP's new 286 emulator installs inside the case of the company's external hard-drive system. Watch for a review in an upcoming issue.)

In the case of ***Vortex***'s **ATonce-Plus** emulator ($399), PC/AT emulation is well refined for your A500. To install it, open the computer, pop out the 68000 chip, press the ATonce-Plus into place, and then insert the 68000 into a socket on top of the ATonce-Plus. Finally, reassemble your computer.

With the software provided, you can run many IBM-PC applications and utilities on your Amiga 500. Of course, like any other product that uses the CPU socket, you must sacrifice other options.

Unlike Vortex's AT emulator, ***Supra***'s **Power PC Board** ($399.95), an 80C86 emulator, fits into the expansion slot of the A500. It does not seem to work with the AdIDE controller (although it is not a good practice to stack things on the processor socket, anyway). Further, it lacks AT capability, which dates its technology. New software reportedly supports hard disks, VGA, and other video modes, as well as extended memory.

A different type of medicine is necessary to cure video flicker. If you work in high-resolution interlaced mode, you know how annoying that flicker is. You may also know that ***ICD***'s **Flicker Free Video** ($299), which works in combination with a multisync monitor, is the only A500 add-on to provide relief. (For a full review of Flicker Free Video, see Aug. '91, p. 16. For a discussion of multisync monitors, see "Screen Tests," p. 39 in this issue.) Flicker Free Video plugs in between the



Like ICD's AdRAM, Expansion Systems' BASEboard is a two-piece system; three-piece with an optional 4MB attachment.

Denise chip and its socket and extends from the Denise to the back edge of the motherboard.

RAMbunctious

Unlike flicker, RAM is something Amiga owners cannot get enough of. If you decide on a multipurpose board—such as the In-Mate, Mega-Midget, or VXL*30—that provides slots for fast RAM, you may not want to bother with anything else. (In the case of accelerators, adding here gives you the most bang for your buck. See "RAM For All Seasons" on p. 31 of this issue for the lowdown on all kinds of RAM expansion.) Similarly, if you already have an external expander—a RAM-only or RAM-and-hard-drive unit—you may be able to add memory to it while leaving your other options open.

Otherwise, adding to the A501 expansion slot beneath the chassis is a good solution with only one drawback: Because the Power PC board also occupies the A501 slot, you must choose between it and A501-style RAM cards. Excepting that, cards inserted into the A501 slot do not get in the way of other internal devices and seemingly offer 100% compatibility with hard drives and accelerators.

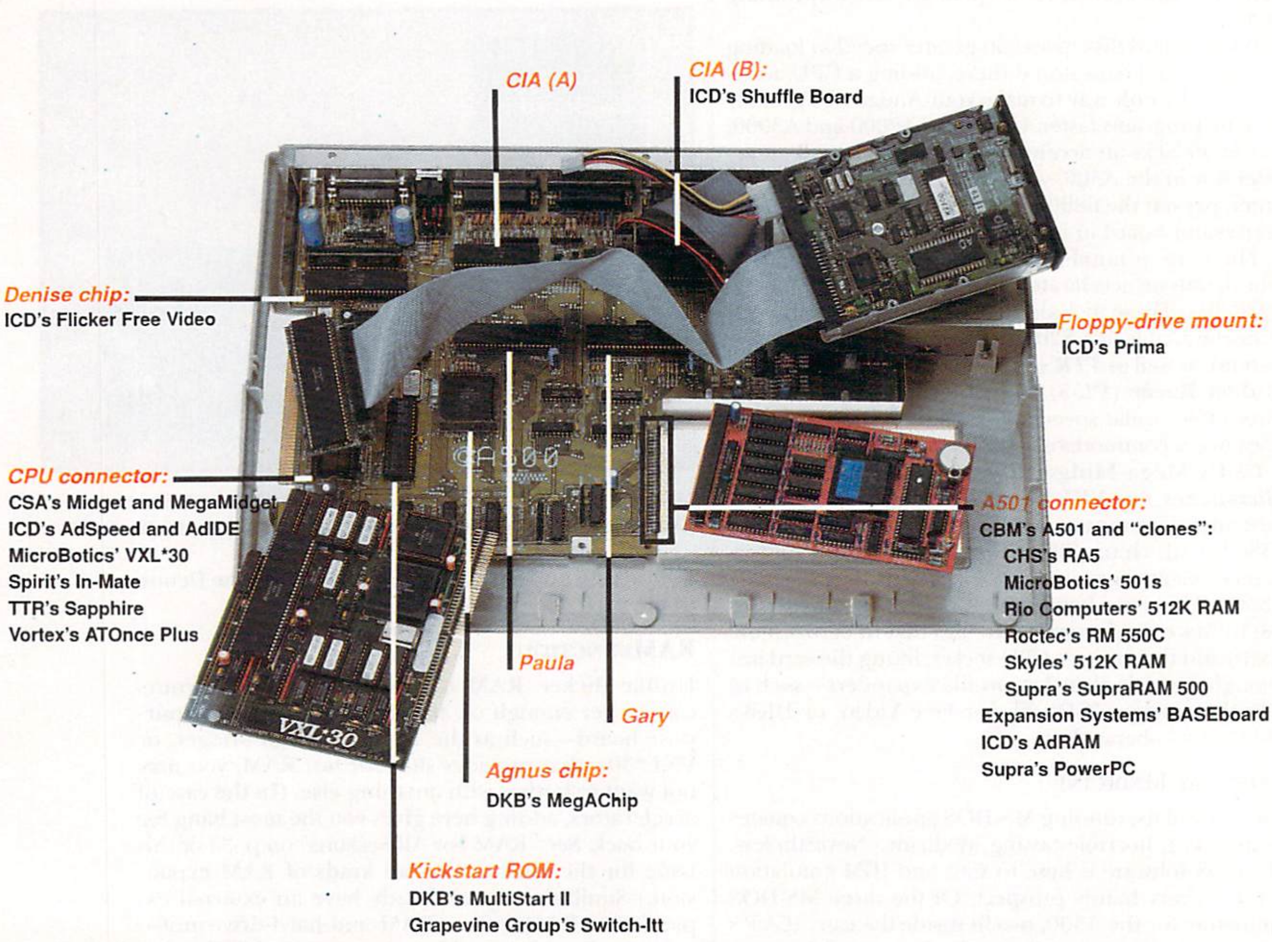
Adding a 512K-only board such as the ***Commodore* A501** or a compatible involves nothing more than opening the trap door beneath the 500 and pushing the card into place (see the list of other half-meg boards that accompanies the photo on p. 30). If you are sure you will not want more than an additional 512K on the underside, the half-meg cards are an easy, reliable, and inexpensive solution.

Unless you have another means of adding memory, ►

INSIDE OUT

You're not familiar with the A500's motherboard? No problem! We've identified the major chips and connectors that internal expanders plug into, noting which products attach where.

The expansion devices shown hovering above the motherboard are (counterclockwise from the top right): ICD's Prima hard-disk drive, which runs a cable to the left side of the A500 where the AdIDE controller installs beneath the 68000 chip. MicroBotics' VXL*30 (bottom left) is representative of the larger peripherals that require CPU connection. At the lower right, Supra's Power PC board heads toward the Amiga's A501 connector. Although you see it from the top, installation of boards that attach here usually involves nothing more than popping the hatch on the computer's underside and making the connection.



however, you may want to consider a more flexible solution, such as ***Expansion Systems'*** **BASEboard** ($129.95 unpopulated) or ***ICD***'s **AdRAM 540** ($109 unpopulated). Both products allow up to 4MB of RAM—6MB with an optional component. There is a small price to pay for this boost in expandability: These boards are slightly more complicated to install than the 512K expanders. In addition to slipping the main board into the A501 slot under the computer, you must install a secondary board between the Amiga's Gary chip and its socket on the motherboard.

If you also want to increase your chip RAM quotient, ***DKB*** offers **MegAChip 2000/500** ($299.95; see the review on p. 74, May '92). This little board installs in the Amiga's Agnus socket and lets you plug in Commodore's Super Agnus chip, which allows you to access 2MB of chip RAM for graphics and other applications that require the Amiga's custom chips. Because it comes with one megabyte of RAM installed, you need only another half-megabyte in the A501 slot to access the full amount of chip RAM. MegAChip does not take away from your maximum fast RAM total; with the additional megabyte of chip RAM, your system ceiling is 10MB, not the usual 9MB.

THE FINISHED PRODUCT

If you have come to the conclusion that the Amiga 500 is a good platform for upgrading on a budget, you're right. Sure, its diminutive size and lack of internal space make modifications a challenge, but you can expand with good results. It's a remarkably gratifying experience to take a computer apart, install new components, reassemble the parts, and see everything working once again. ■

"BIG 3" UPGRADES—PART I: MEMORY



RAM *For All Seasons*

While buying RAM is a dicey business, there's no reason to lose your head over it. Here in Part I (Memory) of a three-part series on upgrading essential system resources, you'll discover the various types of RAM, their uses for different applications, and the available configurations/combinations.

If this were indeed Utopia, we would not have to worry about our memory failing. In this less-than-perfect world, however, we not only have to be concerned about our own memory, but that of our computer. A few years back, 512K seemed like all the room in the world. These days, though, more and more software packages are coming with labels that read "One Megabyte Required" or even "Two or More Megabytes Recommended." As applications become ever more sophisticated, you may find it difficult to run one program at a time, let alone multitask.

Fortunately, your computer's memory, unlike your own, is easily expanded. Once you have come to the conclusion that it's time to upgrade, however, you are immediately faced with an avalanche of questions. How much memory should I get? What kind of upgrade: internal or external? single-function or combination board? chip or fast? 16- or 32-bit? Taken together, the choices involved may seem overwhelming at first, but as we consider them one at a time, you will soon find that they are not so hard to sort out. *(For information on contacting the developers of products mentioned in this article, consult the "Manufacturers'/Distributors' Addresses" list on p. 102.)*

CHIP RAM VS. FAST RAM

The computer's main processor chip uses memory to store programs and the raw information those programs manipulate. Unlike most computers, the Amiga has additional processor chips that can display graphics and play music, independent of the main processor. These coprocessors also need to use memory as temporary storage for their instructions and data.

Every Amiga has a limited amount of memory, called *chip* ►

By Sheldon Leemon

ILLUSTRATED BY NEIL BRENNAN

RAM, that can be shared between the main processor and the graphics and sound coprocessors. The total amount of chip RAM is restricted to 512K, one megabyte, or two megabytes, depending on which version of the Agnus chip your computer supports. In addition to chip RAM, every Amiga is capable of using *fast* RAM, a type of RAM that is accessible only by the main processor, not by the coprocessors.

Only the A3000 provides sockets for adding fast RAM to the system, and it allows you to easily add more than 8MB. On all other Amiga models, you must add some kind of board to hold the fast RAM; also, you are generally limited to 8MB of 16-bit fast RAM (although you can surmount this limit by adding accelerator boards, as we shall see later in this article and in the sidebar "Accelerating Memory").

Most expansion RAM is fast memory, since that is the type most easily added. Most of this article, therefore, will deal with fast RAM expansion. Having enough chip RAM, however, is also very important (see the sidebar "Don't Stint on Chip RAM"). So, in the rest of this section, let's first examine the various ways you can increase chip RAM, depending on the system you own.

For owners of early A2000s, the process is as simple as buying a new Agnus chip and changing a motherboard jumper, which converts all of the memory on the motherboard to chip RAM. Your dealer should be able to make this alteration for about $100.

Many Amiga 500 owners already have an Agnus chip that supports 1MB of chip RAM. Generally, however, this capability has not been activated, because doing so prevents the A500 from operating without the A501 or similar expansion module installed and may also cause incompatibility with some peripherals. (The A501 is Commodore's 512K RAM expansion and clock module that plugs in the slot beneath the "trap door" on the bottom of the A500.)

The modification required to activate 1MB of chip RAM on the A500 is fairly simple, but Commodore strongly discourages it: The company will neither provide warranty service on motherboards that have been so modified, nor will it accept them in trade for replacements. This policy may soon change, however, as the upcoming CDTV add-on for the A500 is reported to require 1MB of chip RAM. Until then, you should think twice before making the modification.

Expanding the Amiga 3000 to 2MB of chip RAM is easy. All you have to do is remove the chips installed as fast memory and plug them into the chip RAM sockets, as detailed in the manual. Currently, however, the only way to expand an A2000 or A500 to 2MB of chip RAM is with ***DKB***'s **MegAChip 2000/500**, a plug-in expansion board that requires the same two-meg Agnus chip as the A3000 (part number 8372B). This board costs about $399 with the Agnus chip installed.

The only way that Amiga 1000 owners can expand their chip memory past 512K is to purchase either the **Rejuvenator** daughterboard replacement ($439.95, ***Expert Services***), which now handles up to 2MB of chip RAM (add on another $125 for the RAM itself), or the **Phoenix** motherboard replacement, which comes with 2MB of chip RAM installed ($850, ***Phoenix Microtechnologies/Grapevine Group***).

The Physical Connection

While Commodore has provided several methods for adding expansion RAM to the various Amiga models, enterprising manufacturers have come up with some unusual methods of their own. Let's examine each of the four basic Amiga systems—A3000, A2000, A500, and A1000—in terms of internal and external architecture and then see how RAM expansion products from a variety of hardware developers succeed in delivering additional memory in each instance.

Please note that—except in certain very specific cases—no price information will be given for the various memory-expansion devices presented in the rest of the article. There are so many different factors likely to influence the exact configuration you may choose—amount of RAM, type of RAM, system configuration, RAM expansion in combination with other peripherals, etc.—that individual prices for stand-alone, unpopulated boards or even ballpark package costs will not be of much help. Use the information below to help you figure out what kind of expansion—and particular configuration—best suits your system needs, and then contact the manufacturer or your dealer to discuss price options.

Expanding memory is easiest in the the A3000, because that system comes with sockets for additional RAM right on the motherboard. The A3000 has four rows of sockets that can be filled with either one- ►

Don't Stint on Chip RAM

ALL AMIGA MODELS except the A3000 come with only chip RAM installed. The main processor and the coprocessors take turns using this RAM; most of the time this sharing is not evident, because one processor uses the RAM only when the other is busy doing something else. If the graphics chips are very busy doing complex graphics, however, they can make the main processor wait to access chip RAM, slowing down all main processing operations. That's why it is helpful to have at least some fast RAM. Because only the main processor can use fast RAM, it never has to share it with the coprocessors.

On the other hand, no matter how much fast RAM you add, if you only have 512K of chip RAM, you may not be able to run several graphics-intensive programs at the same time or to make use of such options as holding large graphics clips in memory. Even with 8MB of fast RAM, you will probably be unable to make adequate use of such popular programs as ASDG's AD Pro, Electronic Arts' DPaint IV, or Gold Disk's Pro Page 2.0—not to mention 24-bit paint programs such as Digital Creations' DCTV Paint and Impulse's Light24 or NewTek's Video Toaster software.

A500, A2000, or A1000 owners with less than 1MB of chip RAM who use a lot of graphics-oriented programs should look at increasing chip memory. Also, some owners of A3000s with the standard 1MB of chip RAM installed may even want to consider expanding to 2MB. □

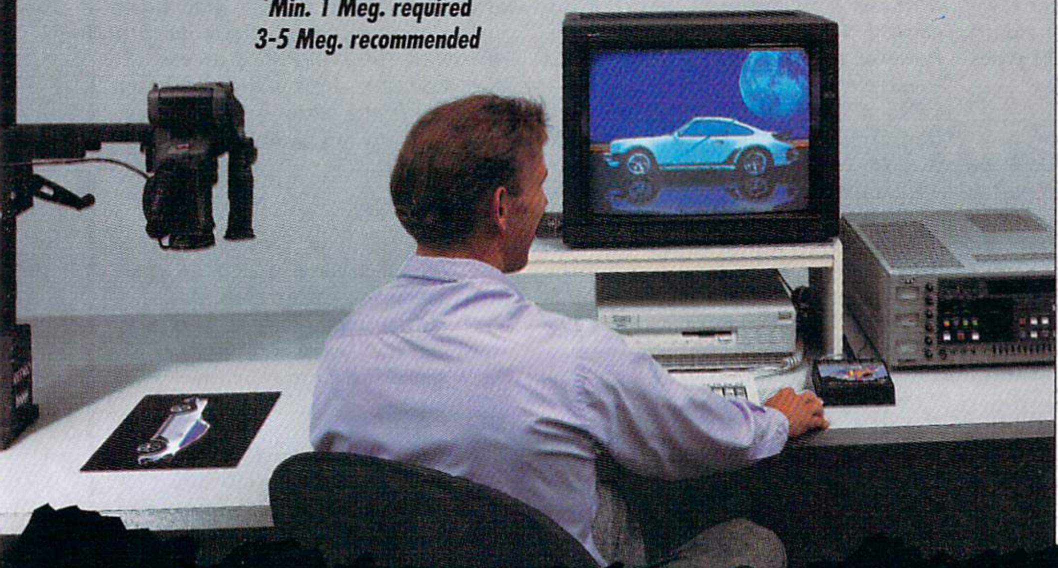
All photographs are of actual DCTV screens.

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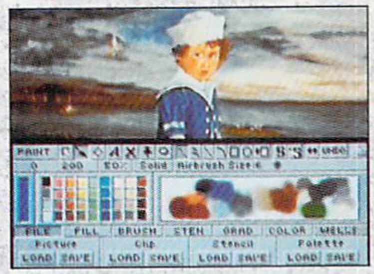
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megabit (256×4) or four-megabit (1 meg×4) ZIP chips. You can add 1, 2, 3, or 4MB if you use one-megabit parts, and 4, 8, 12, or 16MB of fast RAM using four-megabit parts.

You cannot mix chips of different densities, however, so once you install the one-megabit parts, you are limited to 4MB of expansion. Nor can you mix page-mode and static-column RAMs. (See the sidebar "Memory Chip Buyer's Guide" for explanations of the various types of RAM chips.) For this reason, most A3000 owners add memory in 4MB increments, using four-megabit static-column RAM chips. For those "power users" who find 16MB of fast RAM too limiting, ***Progressive Peripherals*** sells a 64MB **ProRAM** card for the A3000 that fits into a 32-bit expansion slot. (You can use A2000 RAM cards in the A3000.)

The Amiga 2000 does not have any sockets for fast RAM on the motherboard, but it does come with five 16-bit expansion slots that can be used for memory cards. Several manufacturers make RAM expansion boards for the A2000, most of which allow you to add from 2 to 8MB of 16-bit fast memory in two-megabyte increments. These include ***Commodore***'s **2080**, ***GVP***'s **A2000-RAM 8/0** half-card, ***Supra***'s **SupraRAM 2000**, ***MicroBotics***' **8-UP!**, and ***ICD***'s **AdRAM 2080**.

The biggest difference among these boards is the form of memory chips they use. Most boards require you to plug in DIP-format (Dual Inline Package) memory chips. Some, however, use SIMM (Single Inline Memory Module) packages. SIMMs are much easier to add yourself, requiring only one module per megabyte. (See the sidebar "Memory Chip Buyer's Guide" for more on DIPs and SIMMs.)

The Amiga 500 has neither sockets for more RAM, nor any internal slots for memory-expansion cards. All it provides is an external expansion connector and a single memory connector located behind a plastic hatch on the bottom of the computer. This connector was designed for Commodore's A501 or similar 512K expansion modules such as those available from Rio Computers, ICD, and Phoenix/Grapevine Group. If you have a 512K Amiga 500 and want to expand to only 1MB, you can easily add this kind of module yourself for less than $75—and get a battery-powered clock/calendar at the same time. If you plan to expand to more than 1MB, however, you may decide to skip the 512K expander and go directly to something a little more substantial.

One way to add fast RAM to an A500 is through the external expansion connector on the left side of the computer. Two such RAM-only expansion modules for the A500 are ***Supra***'s **SupraRam 500RX** and ***Golden-IMAGE***'s **RC-1000**. The former is very small, holds up to 8MB of RAM, and provides a pass-through that allows you to plug other peripherals into the expansion connector. In addition to direct-connect A500 memory modules, there are adapters that plug into the expansion connector, providing one or more A2000-compatible slots into which you may plug A2000 memory boards. The newest of these devices is ***Micro R&D***'s **SlingShot** ($39.95), which provides one A2000-style slot connector.

Although Commodore provided for only 512K of memory expansion through the internal connector, several manufacturers have found a way to add up to 4MB or more of fast RAM using boards that plug into ►

Memory Chip Buyer's Guide

DO THOSE ADS for memory chips look like they're written in Greek? They won't after you've learned the standard terms used to describe different types of memory chips:

Package Type

Memory chips come in *DIPs* (Dual Inline Package), *ZIPs* (Zig-zag single Inline Package), and *SIMMs* (Single Inline Memory Modules). DIPs are the familiar rectangular chips with a row of metal legs sticking out of each side. This is the most common package, so unless otherwise specified, a chip will probably be a DIP. ZIPs are long, thin rectangles with slightly bent legs that come out of one side. SIMMs look like small circuit boards holding several memory chips, with a long flat connector on one side.

Capacity and Organization

Chip capacity is measured in bits, not bytes. A *megabit* is one million bits. If you are buying "one-meg" (i.e., one-megabit) chips, you need eight of them to make a megabyte of memory. Because SIMMs use several chips each, however, a "one-meg" SIMM contains one megabyte.

Not all chips use the same organization. Some one-megabit chips are organized as one row of one megabit (1×1), and some as four rows of 256K bits (256×4). (A *kilobit* is one thousand bits.) The most common one-megabyte SIMMs are organized as 1×8, while the most common four-megabyte SIMMs are 4×8. Watch out for 1×9 or 4×9 SIMMS; they're used by IBM-compatible computers, not Amigas.

Speed

Dynamic RAMs come furnished with *access speeds*—measured in nanoseconds (ns)—that range from 120ns (slow) to 70ns or less (fast). Most Amigas use the relatively slow 68000 processor running at 7 MHz, so any chip 120ns or faster works fine. Don't pay more for faster 70ns parts, since they will not make the standard Amiga run any faster than slower chips. When you're buying memory for accelerators with advanced (68030/040) processors, however, faster chips may mean fewer wait states and better performance. Find out from the manufacturer what the speed limit is.

Refresh Type

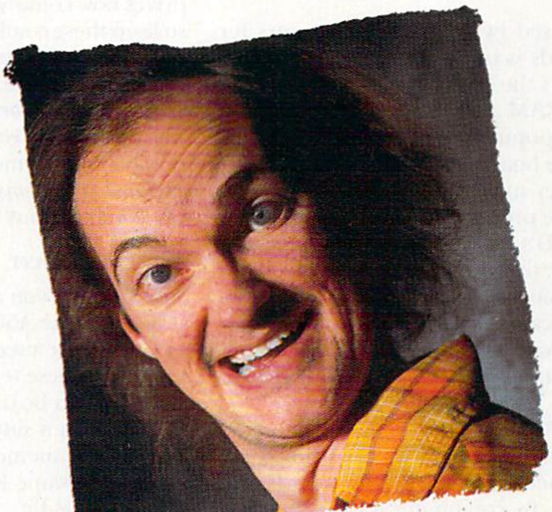
Most boards use *Dynamic RAMs* (DRAMs), which come in high capacities and are relatively cheap. Only a few special boards use *Static RAMs* (*SRAMs*), which are much faster, come in lower capacities, and are more expensive.

Address Mode

The A3000 and some 68030 accelerator boards may use special *Static Column RAM* chips (*SCRAMs*)—instead of the more common Page Mode RAMs—to enable the special "burst" addressing mode. Don't confuse the Static Column address mode with Static refresh.

—SL □











the A501 slot. Most include a small daughterboard that plugs in under the Gary chip to make the additional connections needed to address more RAM. Two such boards are ***ICD***'s **AdRAM 540** and ***Expansion System***'s **BASEboard**.

While the internal boards tend to cost a few dollars less than units that require an external case, they also have some drawbacks. Most cannot autoconfigure all of their memory (beyond a certain point, you have to run a program to add the rest of the memory), and these types of boards are somewhat more likely to run into compatibility problems with certain hardware and software products. Perhaps the biggest drawback, however, is that if you already have a 512K expander plugged in, you must remove it and try to sell it for whatever you can get.

Another location used by some manufacturers for adding memory boards is under the 68000 chip. For the A1000, ***DKB*** offers the **Insider II**, which provides up to 1.5 MB of fast RAM and a battery-backed clock/calendar ($199.99 unpopulated).

Installation of these boards is a bit trickier than for plug-in cards, and they make it hard to use other devices that plug into the processor socket, such as accelerator boards and ICD's AdIDE hard-drive interface. At this point, however, these internal boards are about the only RAM-expansion products left for the A1000. Technically speaking, cards that plug into the A500 expansion port should work on the A1000 as well, but most cover up the two mouse ports when plugged in.

The Right Combination

Much of the cost of adding memory does not come from the chips themselves, but from the boards and boxes that hold them. By combining RAM expansion with other peripherals that also need these boards and boxes, hardware developers can reduce these costs. One of the most popular combinations joins a hard-drive controller to a RAM-expansion card. In fact, these combination boards are so popular that it's hard to buy a hard-drive controller without memory-expansion capabilities.

This means that if you do not have a hard drive but plan to buy one, you may be better off buying a controller with RAM expansion, even if you don't buy the hard drive immediately. Otherwise, you may buy a RAM card now, and end up paying for RAM expansion you don't need when you finally do buy the hard drive.

Combination hard-drive controller/RAM boards for the A2000 include ***GVP***'s **Series II A2000-HC8+**, the ***ICD*** **AdSCSI 2080**, the ***IVS (Interactive Video Systems)*** **Grand Slam**, ***Expansion Systems***' **DataFlyer**, ***Xetec***'s **FastCard**, and the **Nexus 2000** from ***Advanced Storage Systems***. Even Commodore's 2091 controller—which comes standard in computers like the A2000HD and A2500, and separately for the A2000—offers up to 2MB of RAM expansion on the controller (although the company does not heavily advertise this fact). If you have purchased either of these models, you may have built-in RAM-expansion capability without even knowing it!

Hard-drive/RAM combinations are just as popular on the Amiga 500. Since you have to add an external case for the hard drive anyway, it simply makes sense to include RAM-expansion capabilities. Most A500 hard drives now come with built-in RAM expansion capacity, so keep these combination units in mind if you are looking for memory expansion but may want to add a hard drive in the future. Several companies—including ***GVP***, ***Supra***, ***Commodore***, ***Interactive Video Systems***, ***Expansion Systems***, ***Xetec***, and ***Roctec***—manufacture combination hard-drive/memory-expansion units for the A500. ***Expansion Systems*** and ***Xetec*** also sell hard drive/memory combinations for the Amiga 1000.

Wide and Fast

Any memory you add to an Amiga that uses the 68000 processor (the A500, A1000, or A2000) is 16-bit memory, while the memory you add to the A3000 is 32-bit memory. These terms refer to the amount of information that can be transferred between memory and the processor in a single operation, not to any characteristics of the memory chips themselves. In most cases, exactly the same RAM chips are used for 32-bit memory as for 16-bit.

When you connect an accelerator board with an advanced processor like the 68030 to the Amiga 2000 or A500, it still can communicate only with normal system memory 16 bits at a time. To avoid this bottleneck, accelerator boards usually provide a way to bypass the normal systems-communications channel, connecting expansion RAM directly to the 32-bit processor. Accelerators provide maximum speed increases only when some 32-bit memory is attached.

Using 32-bit processors also increases the amount of memory you can add to your system, because they can address up to four gigabytes of memory. By using accelerator memory, you can overcome the 8MB limit on fast RAM imposed by 68000-based machines (see the ►

Accelerating Memory

THE REASON THAT some Amiga models are limited to a maximum of 8MB of fast-memory expansion while others are not so limited has to do with the kind of processor used in the system. The Motorola 68000—the standard processor used in all Amiga models except the Amiga 3000—has a 16MB address space. The A500/2000 architecture reserves 2MB of that space for chip RAM and 6MB for devices and Kickstart ROM, leaving a maximum of only 8MB available for fast RAM.

Advanced processors such as the 68030 and 68040 can address up to a whopping four gigabytes (4096MB) of memory. The reason that A3000s and other accelerated Amiga systems can exceed the 8MB fast-RAM expansion limit is that the 030/040 accelerator memory configures above the normal 68000 autoconfig address space. While the additional memory does not autoconfigure (with the exception of CSA's 40/4 Magnum, the memory must be added to the system by a separate program), this is a small price to pay for potentially enormous increases in system memory. □

sidebar "Accelerating Memory" for an explanation of why this is so). While no accelerator at present comes remotely close to tapping the four-gigabyte maximum, these boards at least represent a start for those users who require large amounts of additional RAM.

For instance, the maximum expansion capacities of ***GVP***'s line of **68030 accelerator cards** for the Amiga 2000 range from 13 to 16MB. While ***Commodore***'s own **2630** accelerator can handle only either 2 or 4MB of 32-bit RAM, ***DKB***'s forthcoming **2632 RAM card** will allow 2630 users to add over 100MB of RAM to their boards. Some 68030 boards, such as the ***CSA*** **Mega-Midget Racer** and the ***MicroBotics*** **VXL-30**, will also fit into the Amiga 500. In addition, ***CSA*** offers a 32-bit RAM board, the **MM 2150**, that adds up to 8MB of 32-bit RAM to the Mega-Midget, and ***MicroBotics*** plans to introduce its own RAM add-on for the VXL.

The next-generation 68040 accelerator boards allow you to add even more 32-bit RAM. Maximum memory on A2000 accelerator boards ranges from 32MB for the ***RCS*** **Fusion Forty** and ***Progressive Peripherals*' 040/2000**, to 32MB for the ***CSA*** **40/4 Magnum**. For the A3000, ***GVP***'s **G-Force** accelerator tops out at 8MB, while ***Progressive Peripherals*' Mercury** allows for 32MB.

Once you have bought an accelerator, any further RAM that you buy should probably go on the accelerator in order to get maximum speed from your RAM purchase. Do not, however, let a planned purchase of an accelerator board stop you from buying needed 16-bit RAM now. Any extra 16-bit RAM you acquire may still be used once your accelerator is installed.

DECISIONS, DECISIONS...

As you can see, there are lots of ways to add RAM to your Amiga. When you go to buy expansion RAM, here are some questions you should ask:

1. *What kind of support can I expect from the company that manufactures this board?* While price and features are important factors in your buying decision, they should not be your sole considerations. Manufacturing hardware add-ons is an extremely competitive business, and companies offering low-cost peripherals come and go all the time—leaving their customers with nowhere to turn when problems arise. If you take the time to find a company that has substantial resources, has been in business for a while, provides its users with an upgrade path, and has earned a good reputation for customer support, you will be much less likely to be stuck with an "orphan" later on.

2. *How much total memory will this expansion product allow me to add?* By now, any RAM expansion product that you buy should offer a minimum of at least 8MB of expansion.

3. *Do I get the maximum RAM with this board?* Or, do I have to buy an add-on board after a certain point? A board that delivers full expansion without costly add-ons is clearly preferable.

4. *In what increments can RAM be added?* A board that allows you to add 512K or 1MB at a time provides more flexibility than one that requires you to add 4MB at once. Considering the cost of RAM, however, boards that add a minimum of 2MB at a time are perfectly acceptable.

5. *What RAM packages are used?* SIMMs are easier to plug in than DIPs. ZIPs tend to be a bit more expensive and harder to find than either SIMMs or DIPs.

6. *What RAM densities are required to achieve maximum memory?* Currently, one- and four-megabit parts are about equal in cost per megabyte, and either type should do fine. Boards that use four-megabit parts require fewer chips, which make them both easier to populate and lower in power requirements, but these boards may require you to add memory in larger increments. You will probably want to avoid boards that still use 256-kilobit chips, because they require you to add 32 chips for each megabyte of memory.

7. *If a board allows you to use several types of RAM, can you use more than one type at a time?* Some boards can use either one- or four-megabit parts, but once you add one-megabit chips, you cannot use any higher-density parts without first removing all of the memory you have already installed (the Amiga 3000 uses this sort of expansion scheme). Boards that allow you to mix and match various RAMs provide the most flexibility. If the board you choose does not have this capability, you should probably use only the density of chip that provides maximum expansion capabilities.

8. *Does all of the memory autoconfigure?* Almost all expansion RAM is automatically recognized by the system, but some requires configuration software—particularly 32-bit boards that add memory above the 16-megabyte address space of the 68000. Autoconfiguration is less of an issue if you have a hard drive, because you can add the configuration process to a single startup file rather than to every floppy that you own.

9. *How much memory should I add now?* That's the 64-megabyte question, and the answer depends on what kinds of programs you use and how much money you have to spend. Since all but a few programs run on systems that have 1MB of chip RAM and 2MB of fast RAM, that's an excellent place to start. If you use programs like ASDG's Art Department Professional or Digital Creations' DCTV Paint, however, you'll want at least 4MB of fast RAM and possibly more. If you use NewTek's Video Toaster, you really should have 8MB of fast RAM and 1 or 2MB of chip RAM. If you are a 3D-rendering fanatic (like *AW*'s Lou Wallace!) the answer is "all you can get, and more."

There really is no wrong way to add RAM to your Amiga. However you accomplish it, you'll increase both the number and sophistication of the applications that you can run at once. So, boost your RAM! ■

Next month: Part II of Sheldon Leemon's series will focus on buying additional processing power through accelerators. After that, Part III will look at increasing storage capacity.

Sheldon Leemon is a well-respected authority on virtually every aspect of the Amiga. When he is not writing books or magazine articles, you can find him working at Slipped Disk, a Michigan-based Amiga dealership. Write to him c/o AmigaWorld *Editorial, 80 Elm St., Peterborough, NH 03458.*

SCREEN TESTS



Scouting for the best monitor to display your Amiga's output?
Check out these tips to find the right talent for the part.

"DON'T AUTOMATICALLY BUY the standard 55mm lens they try to sell you with the camera," a photography teacher instructs his class. "You may be better off spending a few more dollars on an adjustable lens. It can save you money in the long run—when you're ready for greater flexibility."

And so it is with monitors. While the "standard" model may suit your needs, it is at least worthwhile to consider other options. Whether you are assembling a new system or tired of an old monitor that delivers a cramped, muddy, or flickering display, you should know what those options are. Sales clerks love people who walk in simply demanding a better display ("Believe me, anything less than this 40-inch screen wouldn't do your work justice, and don't worry, we can arrange multiyear financing"), so you are much better off researching the field *before* you shop. *(To locate the vendors of products mentioned, see the "Manufacturers'/Distributors' Addresses" list on p.102.)*

First, consider the basics. How do you plan to use the monitor? If you do video work, you need a composite display to properly judge how the colors in your projects will appear on tape. For general use, an analog RGB monitor does the job just fine. What do you plan to use the monitor with? It must be able to match the scan rate of the display mode or graphics-enhancer board you are using. Where are you going to put it? Measure your desk space—the larger the display, the larger the case around it. How much can you afford? As always, quality costs. Keeping your answers to these general questions in mind will help you put the specifics in proper perspective as we investigate some of the key issues.

Plan for Scan

The single most important consideration is the monitor's horizontal scan rate. If your monitor cannot sync with your Amiga, you'll be in the dark. Also called the horizontal scanning frequency or synchronization frequency, the horizontal scan rate is the speed at which the rows of pixels are drawn across the screen from the left. Standard Amiga graphics modes display at a horizontal scan rate of 15.75 KHz. Because most monitors refresh the screen 60 times per second, the 15.75 KHz scan rate means the Amiga can draw only about 240 lines per refresh. To create a 400-line hi-res picture, the Amiga must update alternating lines on each pass, which causes the familiar interlaced flicker.

Display enhancers (such as the A3000's built-in deinterlacer, ICD's Flicker Free Video for all other models, and MicroWay's flickerFixer for the A2000) double the horizontal scan rate to 31.5 KHz, allowing twice as many pixel rows to be drawn in the same time period and creating ►

BY LINDA BARRETT LAFLAMME

ILLUSTRATED BY ISTVAN BANYAI



a noninterlaced hi-res display. Productivity mode—new with the Enhanced Chip Set and AmigaDOS 2.0—uses the same principle.

If you plan to use only normal Amiga modes, you need a 15.75 KHz monitor. Such graphic enhancer devices as DCTV (Digital Creations), HAM-E (Black Belt Systems), Firecracker 24 (Impulse), FrameBuffer (Reliable), and the Video Toaster (NewTek) run at 15.75 KHz, as well.

If you prefer Productivity mode or have a deinterlacer, your monitor must run at 31.5 KHz. If you think you might buy a deinterlacer, a programmable-scan-rate graphics board (such as Commodore's A2410, Digital Micronics' Resolver, or Progressive Peripherals' Rambrandt), or GVP's dual-scan-rate IV-24, you should purchase a multisync (or multiscanning) monitor.

First developed by NEC, multisync monitors can synchronize with a range of frequencies. Study the spec sheets carefully before you buy, however. Some newer multiscanning monitors are designed for transition between IBM's VGA and SVGA modes and do not scan below 30 KHz. Similarly, some EGA-to-VGA monitors may not scan below 20 KHz. If you intend to use your monitor with 15.75 KHz Amiga modes, avoid these. Multiscanning monitors, while good for covering all your bases, are more expensive than fixed-frequency monitors (more on prices later).

Better Resolution?

The second major consideration is resolution, and here what a monitor *cannot* do is as important as what it can. A picture's resolution is determined by the mode in which it was created and saved—not by the monitor that displays it. If you create a 320×200 lo-res picture, its resolution will not improve by a factor of 16 when you output it to a monitor capable of resolutions up to 1280×800. The 320×200 graphic does not contain the required information for a 1280×800 display. The im-

Look Sharp

The factors that differentiate a top-of-the-line monitor from a fuzzy, grainy headache inducer are dot pitch, color convergence, linearity, pincushion (or barrel) distortion, keystone distortion, focus, high-voltage regulation, and color balance and tracking. Let's consider these attributes one at a time.

The inside of a monitor's screen is covered with myriad groups of red, green, and blue phosphors. To produce an image, the monitor's electron beams are fired across these dots, turning them into points of colored light. The colors you see on screen are determined by the relative strength of the various beams. If they are of equal strength, all three phosphors light up, creating a white dot; if only the red beam is fired, only the red phosphors will light up, and so on.

Dot pitch measures the distance in millimeters between like colors of these RGB triads. The lower the dot pitch (.25mm is the best currently available), the better such fine detail as text will look. High dot pitch (.52mm is about the maximum) gives a grainy display. For the best picture on 12- and 14-inch monitors, dot pitch should be .28mm or less; for 16-inch or larger monitors, look for a dot pitch of .31mm—or less if you plan on working frequently in such super-high resolutions as 1280×1024. Commodore's 1084S and 1950 have dot pitches of .42mm and .31mm, respectively.

Related to dot pitch, color convergence describes how closely the red, green, and blue electron guns combine on a given spot to create a white line or point. If they do not converge as closely as they should, you will see a colored fringe along the white. The best test for this phenomenon is to display and examine a grid of single-pixel white lines, white dots, or both (see Figure 1). Unfortunately, most monitors do not let you adjust whites to be whiter.

You can, however, adjust a monitor's linearity, the accuracy and consistency of the electronic beams' sweep rate. Elongated or squashed areas on screen, especially visible during scrolling, betray a monitor with poor linearity. With your grid pattern on the screen, measure the distance between pairs of lines. If you notice discrepancies, make sure the monitor has adjustment controls.

The same grid will help you spot pincushion and keystone distortion, as well. Pincushion, or barrel, distortion causes vertical or horizontal lines at the edges of the screen to curve to the shape of a barrel or an old pincushion instead of running parallel. Keystone distortion is similar, except that the vertical (or horizontal) lines angle toward each other at the top or bottom (left or right) of the screen to form the shape of an archway's keystone. Most monitors include controls to reduce the outward or inward bowing and slanting.

You can probably spot focus problems without any test patterns, but the grid and fine text come in handy. Occasionally, focus can vary from a monitor's center to its edge. In this case, unless the monitor has dynamic focus, which changes as the beams shoot across the screen, you'll have to compromise between the appearance of the center and the edge. Be careful if you decide to

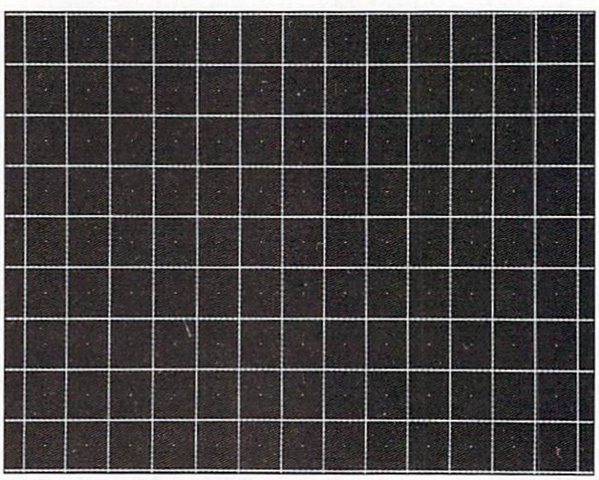


Figure 1. A white grid with dots helps you identify problems with linearity, pincushioning, keystoning, color convergence, and focus.

age quality will improve, however, based on the quality of the monitor's display. (For tips on judging display quality, see the sidebar "Look Sharp.")

To understand this, imagine you have an old color TV that displays bleeding colors surrounded by auras. To compound the problem, you cannot get good reception of channel 5 because the signal is impaired by a nearby mountain. If you buy a new, top-of-the-line TV, sharp crisp colors will replace the bleeding aura, but channel 5 will still be static-filled because you receive the same information from its mountain-impeded signal.

Bigger is Bigger

The lure of bigger equaling better is strong, but a bigger monitor screen also means a deeper box and a larger price tag. Monitors with 14-inch screens (measured diagonally like a TV) average between 14 and 16 inches deep, whereas 16-inch screens push the case back another two to three inches, and 20-inch beauties stretch out 20 or more inches.

Prices increase proportionally, as well. Depending on the quality, a multiscanning 14-inch monitor typically runs between $350 and $1000, while 16-inch models range from $600 to $2000. Now hold on to your checkbook, because prices for 20-inch multiscan monitors start at $2000 and peak at over $4000. Fixed-frequency monitors of the same sizes cost less on average than their multiscanning counterparts. By comparison, Commodore's fixed-frequency 1084S offers a 13-inch screen and retails for $399.95, while the multiscanning 1950 sports a 14-inch screen and lists at $799.

Besides your wallet and desk space, what determines how big is big enough? If you do mostly text-based work, a 14-inch screen should suffice. If you're heavily involved in graphics, especially hi-res or better, step up to a 16-inch or larger screen. The benefits of 24-bit color and 1280×1024 resolution are squandered in a ►



tweak a monitor's focus, for the adjustment is usually on or near the high-voltage supply, and you can burn out your monitor's phosphors if you tamper with it improperly.

The monitor's high-voltage regulation determines how well size changes are controlled when an image changes brightness. For example, if you switch the palette of a predominantly dark picture to primarily light colors on a poorly regulated monitor, the image's size blooms. Measuring the box before and after you reverse the colors in Figure 2 is a good test of performance in this area.

If you use your Amiga for graphics or video work, a monitor's color balance and tracking are of the utmost importance. The best clinical tests are gray and color scales (see Figure 3) and standard video color bars. Most monitors have a pair of controls for each color, called high and low, bias and cutoff, or something similar. The former adjusts each color at maximum brightness, while the latter determines the level at which black begins for each color.

While each of these test screens (available together as testpatt.lha on BIX) are helpful, they give only a partial evaluation. The best aesthetic test is a sample of something you use your monitor for most—a piece of your own artwork, a sample desktop-publishing page, a page of text, or whatever. Are the colors true to your vision of the picture? Is the detail work or text sharp and distinct? Does it look better than what you're used to? Don't view the monitors in isolation, either. Remember, a VW Beetle is better than a bicycle, but a Rolls Royce is better still.

—LBL □

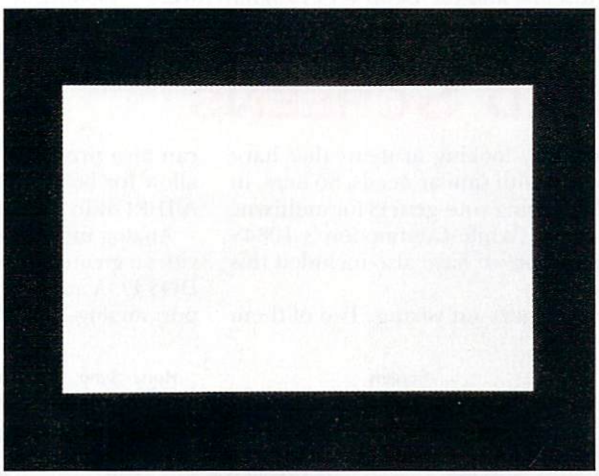


Figure 2. Reverse the colors of the box and border to spot image bloom.

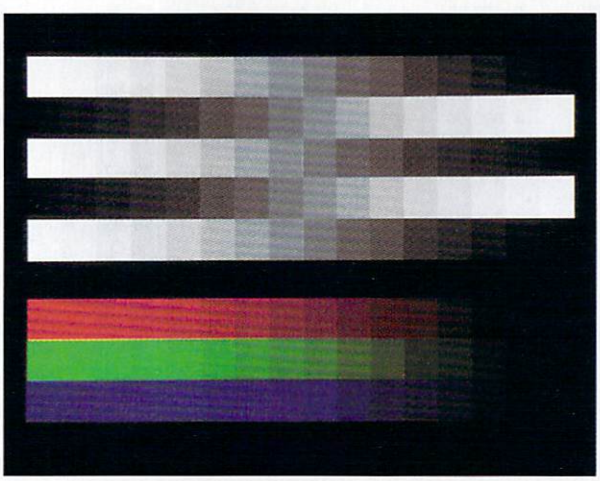
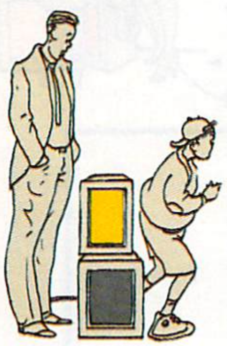


Figure 3. Gray, red, green, and blue scales help you judge color purity.

smaller screen because the fine details are cramped together. For desktop publishing, you need at least a 19-inch screen to legibly display two pages of a document side by side. Opting for a monochrome unit will save you money here.

Take along a tape measure when you shop, because the advertised size may describe the physical screen, but not the usable display area. While the display on the Amiga's 1084S reaches behind the bevel edge on all sides, this is not the industry standard.

On many monitors that are designed for IBM display modes, such as VGA, the usable display is surrounded by a black border up to an inch wide. While it may take some getting used to, the border does offer a benefit when you use standard overscan or 2.0's severe overscan modes: You gain the use of the pixels that would be hidden by the bevel on the 1084S, giving you a true 724×480 screen. The border is a problem, however, if you do video work. To match the broadcast video format, the border must be hidden behind the bevel, unless you like a black box around your cartoons and commercials.



Most monitors do have vertical adjustments that let you reclaim the top and bottom borders, but they do not possess horizontal counterparts. Those two vertical inches you gain may be fuzzy or distorted as well, because the focus is adjusted for the center of the screen. A few monitors (such as the Princeton Graphics Systems' Ultra line and the Loop CT1458) have overscan switches that allow your display to fill the screen.

The Finer Points

While a monitor's display should be the basis of your purchase decision, there are a few "extras" that might help you cast the deciding vote between two models of equal quality.

If you plan on changing resolutions frequently, make sure the monitor has autosizing—the ability to properly size and center the display when you switch screen modes. Check to make sure that the adjustment controls are easy to access and logically placed. If you cannot see the screen while you tweak a setting, how do you know you are improving the display? Also check to see if the screen is treated to reduce glare, and if so, how. An etched surface can cast a fuzzy look on images, while dark glass or polarizing dim the picture more than other methods. A swivel base not only helps to reduce glare, but also gives you more flexibility in positioning.

Rather than attempt to test every available monitor in a lab setting, AmigaWorld polled your fellow users on the major networks and the telephone for recommendations as to which monitors perform well in daily use. See the chart "Suggested Screens" for details on 12 reader-approved multisync monitors, plus Commodore's 1084S.

Your monitor purchase deserves very serious prior consideration, because what you see is what you'll be looking at day in and day out for a long time. ■

Suggested Screens

It is often helpful to begin by looking at items that have earned approval from others with similar needs. So here, in alphabetical order, are the leading vote-getters for multisync displays among Amiga users. (While Commodore's 1084S is not a multiscanning monitor, we have also included this popular RGB/composite unit.)

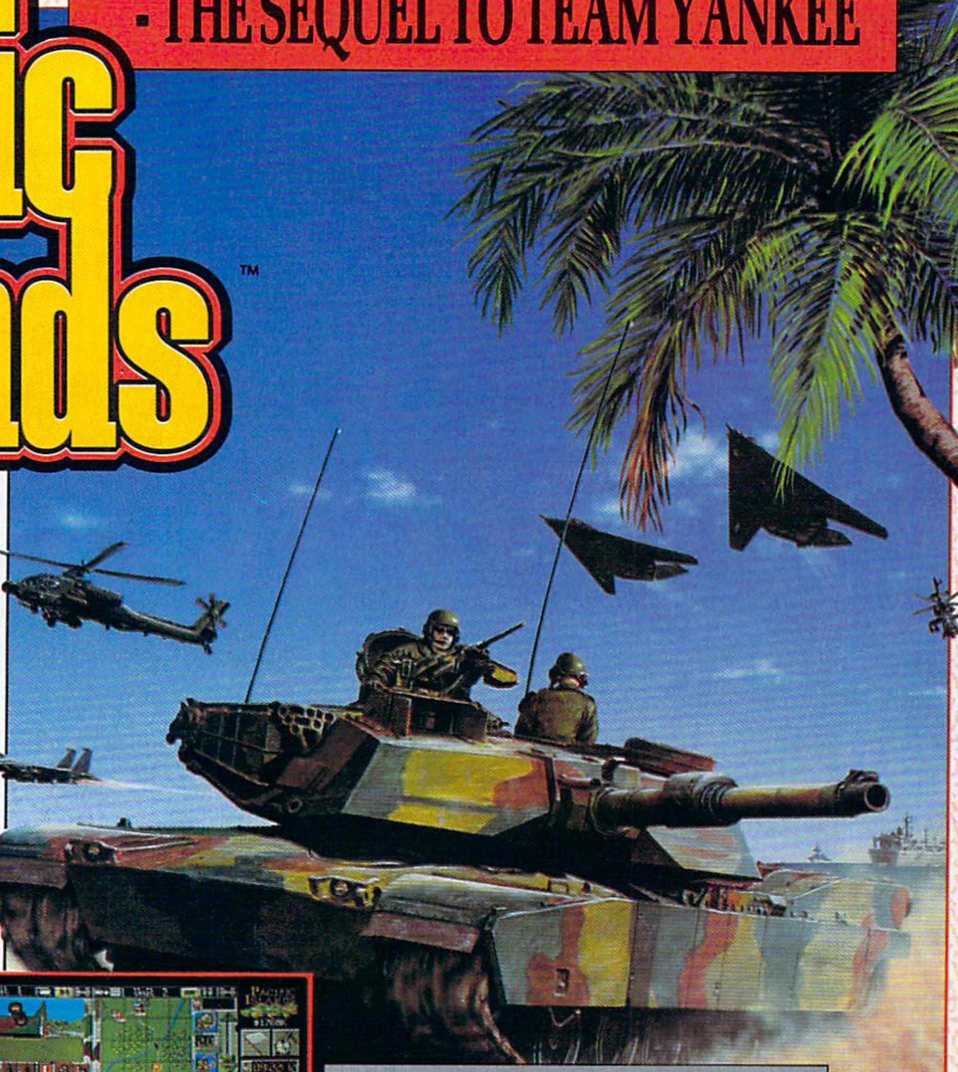
All the monitors listed support autosizing. Two of them can also provide a composite display. Finally, some units allow for both analog and digital RGB displays (noted as A/D RGB in the chart).

Analog mode is preferable for Amiga displays, as it provides a greater color range. (Digital RGB is the mode of MS-DOS EGA and CGA monitors; the newer VGA screens support analog RGB.)

Manufacturer	Model	Price	Screen Size (in.)	Dimensions (in.)	Horiz. Sync Rate (KHz)	Dot Pitch (mm)	Input Accepted	Comments
Commodore	1950	$ 799.00	14	14.6x14.2x15.2	15–35	.31	Analog RGB	
Commodore	1084S	$ 399.95	13	12.6x13.8x15.2	15.73	.42	A/D RGB, Composite	Built-in speaker
Loop Technology	CT1458	$ 369.00	14	15.4x14.4x13.6	15–48	.28	A/D RGB	No autosizing for 1024 res.; overscan switch
Nanao	9070U	$1499.00	16	17.7x15.8x15.9	20–50	.28	A/D RGB	
NEC	Multi-Sync 3D	$ 699.00	14	16x14x14.3	15.75–38	.28	A/D RGB	
NEC	Multi-Sync 4D	$1149.00	16	18.7x15.4x14.5	30–57	.28	Analog RGB	
NEC	Multi-Sync 5D	$2699.00	20	21.5x18.9x18.8	30–66	.31	Analog RGB	
Panasonic	C1381 Panasync	$ 699.00	14	14.4x13.9x14.8	30–37	.28	Analog RGB	
Panasonic	C1395 Panasync	$ 899.00	14	14.4x13.9x14.8	30–57	.28	Analog RGB	
Princeton Graphics	Ultra 1400	$ 899.00	14	15.3x14.1x14.7	15–36.5	.28	A/D RGB	Overscan switch
Sony	CPD-1302	$ 999.95	14	14.6x13.x16.4	15.75–36	.25	A/D RGB	
Sony	CPD-1304S	$ 999.95	14	13.9x13.7x16.2	28–57	.25	Analog RGB	
Sony	GVM-1310	$1295.95	14	15x14.25x16.25	15.75–36	.25	A/D RGB, Composite	Built-in speaker

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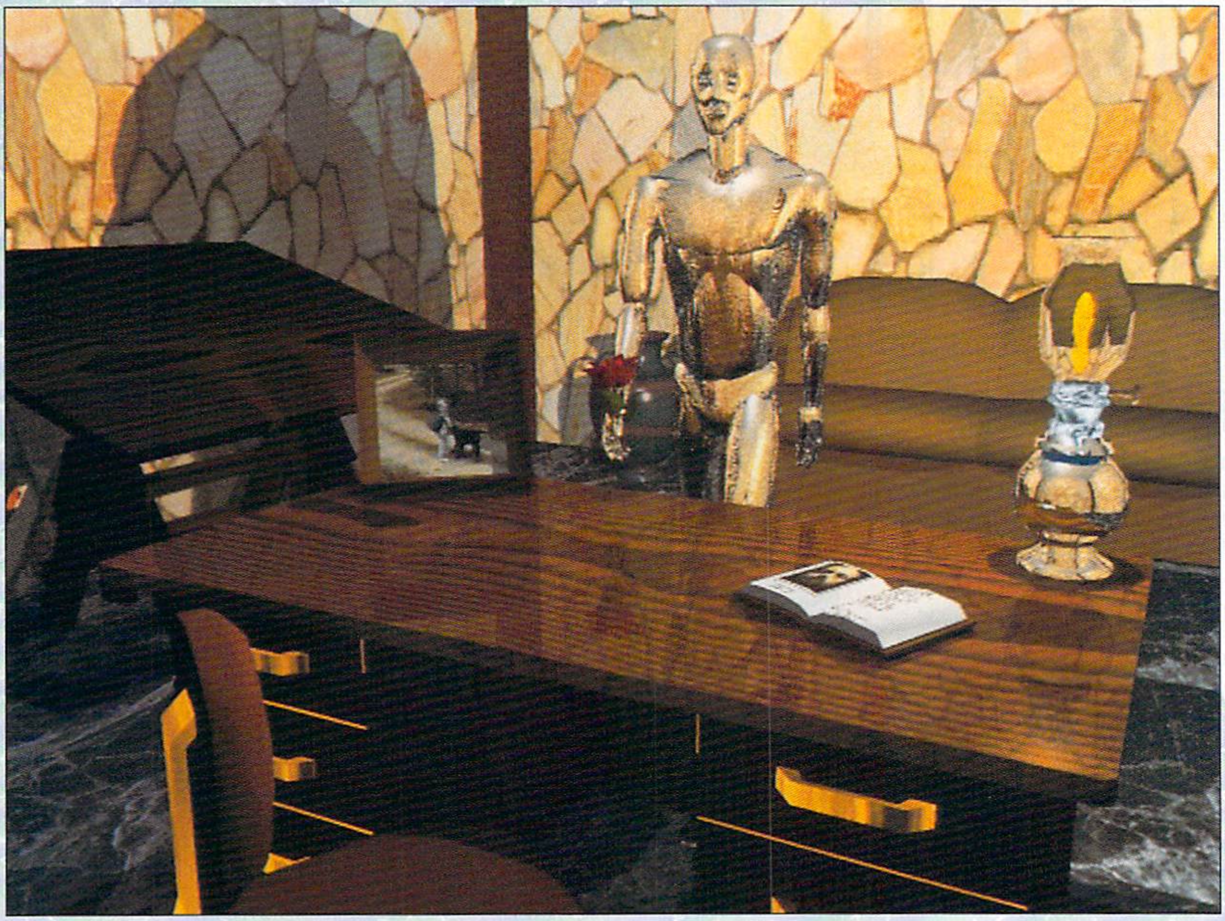
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puts the Toaster's new 2.0 upgrade through its paces

and pronounces the results a major—

and very impressive—success.

By LOU WALLACE

2.0 Video Toaster

WHEN THE MUCH-delayed Video Toaster was finally released in October 1990, it was quickly heralded as a breakthrough in video technology—and with good reason. It really was a milestone in the development of desktop-video hardware and software. From its broad array of digital video effects to the 3-D animation power of LightWave 3D, the Toaster proved it was well worth the long wait.

Now, a year and a half later, ***NewTek*** has shipped an upgrade to the original software. The **Video Toaster 2.0** ($2495; $395 for the software upgrade only) is a major enhancement of the first release, and it is as impressive in its own right as the Toaster itself was when first introduced. No new hardware is required: The new software works with the original Video Toaster card. In this article, we will take a look at that new software, focusing mainly on the features new to 2.0. (See "Amiga Video: Done to a 'T'," Oct. '90, p. 20, and the "Reviews" section, Jul. '91, p. 86, for more on the original release of the Video Toaster.)

If you thought there were a lot of disks in the original Video Toaster package, you had better hold on to your socks. Toaster 2.0 ships on a total of 14 disks, possibly the largest integrated software package yet seen on the Amiga. And if that isn't enough to impress you, wait until you begin to install it. Just about all of the disks contain compressed information, so that the total content is much larger then the 14 disks would imply. In fact, you need more than 40 megabytes of free hard-disk space to install the Toaster 2.0 package. Part of that space is used by some temporary files during installation, but even after those are deleted by the installation software, the final upgrade is more than 30 megabytes.

Obviously, while the Toaster offers a lot of options, it isn't the executable program code that takes up so much space. Rather, 2.0's vast size results from the inclusion of many new digital video effects, more colored fonts for the character generator, and more detailed 3-D objects for LightWave. Nevertheless, almost without exception, every software module in the Video Toaster package has also been enhanced.

Switcher

Using the Toaster's Switcher, 1.0 users were treated to a host of complex transitions known as digital video effects (DVEs) available from four DVE banks. The 2.0 version lays on an entire array of new DVEs, resulting in the addition of two new banks to the Switcher interface. Most of these new effects fall into five major categories based on the subject or style of the transition, with many of them being animated key effects instead of simple geometric changes. ►

My personal favorites are the Organic effects. These transitions simulate the motion of things found in the natural world and would be nearly impossible to reproduce on other switchers (at least in any switcher even remotely comparable to the Toaster in price). These include effects such as smoke, fire, pouring water, and clouds. The transitions are very smooth, almost elegant, and my feeling is that these will be used more often than any of the other new effects.

Another group likely to receive attention are the Action effects. Most of these are sports-oriented, using animated scenes from various sporting events as transitions from one scene to another. There are basketball, baseball, football, golf, tennis, and even weight-lifting transitions. (See Figure 1, bottom row, for a sample transition.) Other action scenarios besides sports are available, such as a flight over a city skyline.

A smaller, but still very important new category includes the Positional effects. You can position the starting points of these effects with the mouse. While you can use these only with a small number of the DVEs, they are nevertheless a welcome addition. Perhaps the best use of these will be in the traditional "over-the-shoulder" window employed by television news shows. While available in the Toaster 1.0 software, this effect was not easily accomplished; but now, with the ability to use the mouse to accurately position the effect, the task becomes a breeze.

Somewhat less useful—and perhaps objectionable in some quarters—are the "Kiki" effects, which will no doubt prove popular with some Toaster fans. Using the well-known NewTek product demonstrator for whom they are named as an animated transition, you can "spice up" your video with twirling bodies, slinky legs, or other similar effects.

The last of the new effects are called Warp effects. These are more 3-D-style transitions, with one video source being "wrapped" onto the surface of geometric shapes such as planes, cubes, and spheres. (See Figure 1, top row, for an example of the "cube" effect.)

Some of the new effects, however, defy easy catagorizing. I mean, where would you place turning gears, turning pages, tearing pages, puzzles, windshield wipers, clapboards, video snow, dripping blood, breaking glass, arrows, hearts, a closing iris, a countdown, animated colorbars, old film, or even falling sheep? (Yes, falling sheep; but don't ask me why!)

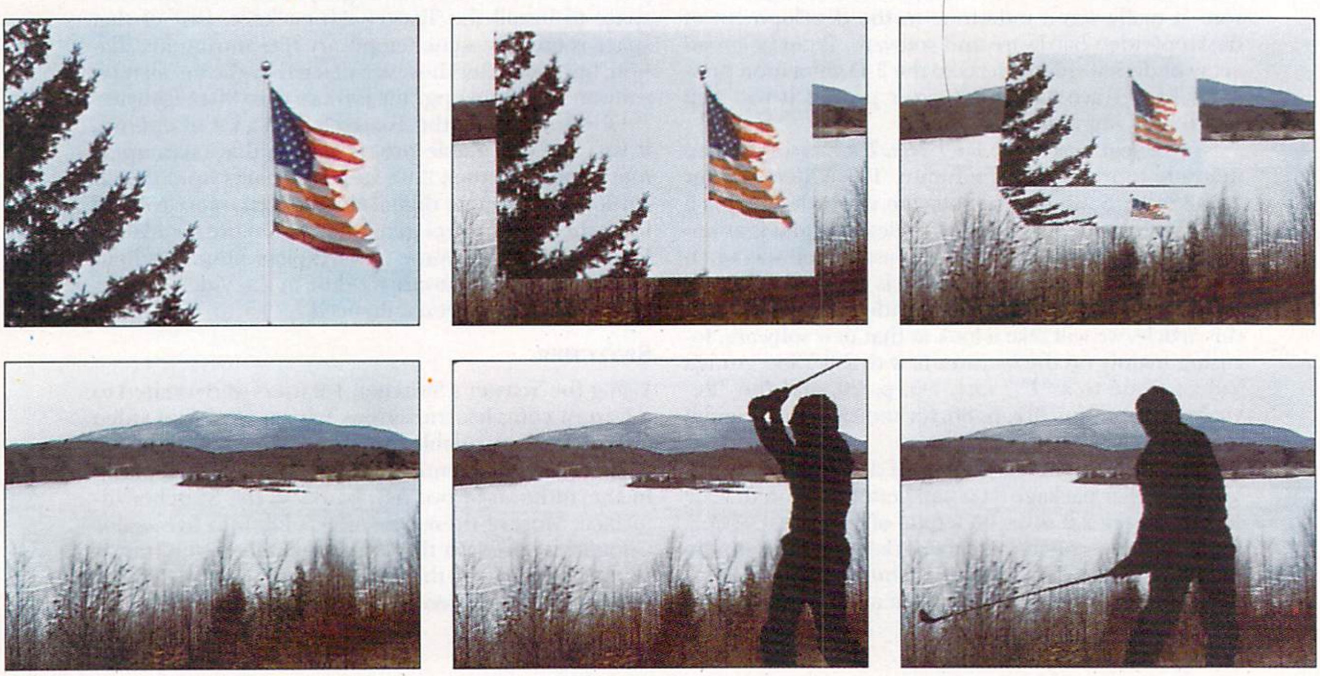
In addition, of course, you will find a variety of effects from the first release. These include various wipes, scrolls, pushes, slides, and myriad other geometric effects and transitions.

Many of the new effects can take advantage of some other new features found in the Switcher. One of these is the ability to perform soft-edged wipes that lend a kind of smooth, antialiased look and feel to transitions.

Another important new feature, called "fade partial transitions," allows you to start an effect, halt it somewhere before completion, and then fade it in or out. An obvious application of this is for the "over-the-shoulder" shots mentioned previously, but I have also used it with split screens that are faded in and out. Unfortunately, this partial fading works with only some of the new effects.

While the DVEs are the sexy new additions to the Switcher, there is a lot more going on behind the scenes. For example, one problem with the early software was the "zipper effect" that manifested itself when you grabbed frames. The "zipper" is a band of about 31 pixels that runs down the far right side of the framestore. According to the new documentation, the handling of image edges in the extreme overscan area has now been improved; in fact, when I grabbed a frame and looked at it in ToasterPaint, the zipper effect was nowhere to be seen. Just to make sure it wasn't merely being hidden by ToasterPaint, I loaded the grabbed frame into Impulse's Light24 and displayed it on the Firecracker. Again, there was no sign of the zipper.

Another welcome addition to the Switcher is the inclusion of proprietary compression for framestores. Depending on the particular screen image, compression



can result in significant savings in hard-disk space. Also, you can load framestores somewhat faster than with the earlier version. (You must save framestores from TPaint in order to compress them.)

If there remains any weakness in the Toaster DVEs, you will see it manifested in those DVEs that compress the video image. Depending on the effect and the degree of compression, such effects may appear pixelized, especially when the transition occurs too slowly. Even these effects, however, when executed at a reasonable speed, remain useful for many video applications.

CG, ChromaF/X, and ToasterPaint

One of the Video Toaster's strong suits has always been that you get a full-function character generator (CG) along with all the other video components. (A CG is used to create titles and other textual messages that can be overlayed onto static backgrounds or incoming video.) The 2.0 Video Toaster CG adds a number of new enhancements. More fonts, including several new colored fonts, are included, bringing the number of different faces supplied—in a variety of point sizes—up to 34. Many of these were designed by Kara Computer Graphics, a company with a well-deserved reputation for high-quality fonts.

Also new in Toaster 2.0 is the ability to render text on top of existing framestores, allowing you to use any 24-bit image as a background for text. You can scroll and crawl text over the backgrounds (and control the speed of such operations). You can also render the fonts that use the crawl or scroll options in both outline and drop-shadow formats.

For me, the single most important addition to the CG is the ability to import ASCII text files created with a word processor or text editor. I have never been very fond of the Toaster's CG editor, and although simple pages of text are easy enough to generate, I didn't fancy using it for long text sequences. Now I don't have to.

There are also quite a few enhancements to the Video Toaster's ChromaF/X module. ChromaF/X allows you to modify the incoming colors of a video signal based on its brightness levels. It recognizes 96 different levels of luminance and can apply different color maps based on those values.

ChromaF/X now has more than 50 different predefined chromatic effects, so you can quickly experiment with them (or create your own). The predefined effects include, for example, Line Art, Nuke, Posterize, Chrome, Snow, Zebra Stripes, Soft Rainbows, and SepiaTone. You can combine these with some of the Switcher's DVEs to create some very interesting effects. For instance, SepiaTone works well with the Film DVE, giving the incoming video an old-fashioned, flickery look. Others are far more exotic and defy easy definition or suggestions for use, although I am sure creative videographers will find applications for them.

Also new to Toaster 2.0 is the ability to select ChromaF/Xs from within the DVE banks. Using the Switcher, you can select from the effects banks up to four color effects chosen from the ChromaF/X module, and apply them to your video signals.

While ToasterPaint has received few new additions in Toaster 2.0, the new version does allow you to use ToasterPaint images as backgrounds for the CG to render onto. You can also now grab frames from within ToasterPaint (instead of having to grab them with the Switcher), save them to disk, and then load them into ToasterPaint for editing. Finally, you can scroll a virtual (larger-than-screen-size) image in ToasterPaint much faster than you could with 1.0.

LightWave 3D

Of all the Toaster's software modules, LightWave 3D sports the largest number of changes and enhancements. With all its new features, LightWave can now be considered as a world-class animation system, comparable to professional packages on other platforms that cost far more then the Video Toaster.

The single most important new option in LightWave 2.0 is ray tracing. While a number of the more popular ►

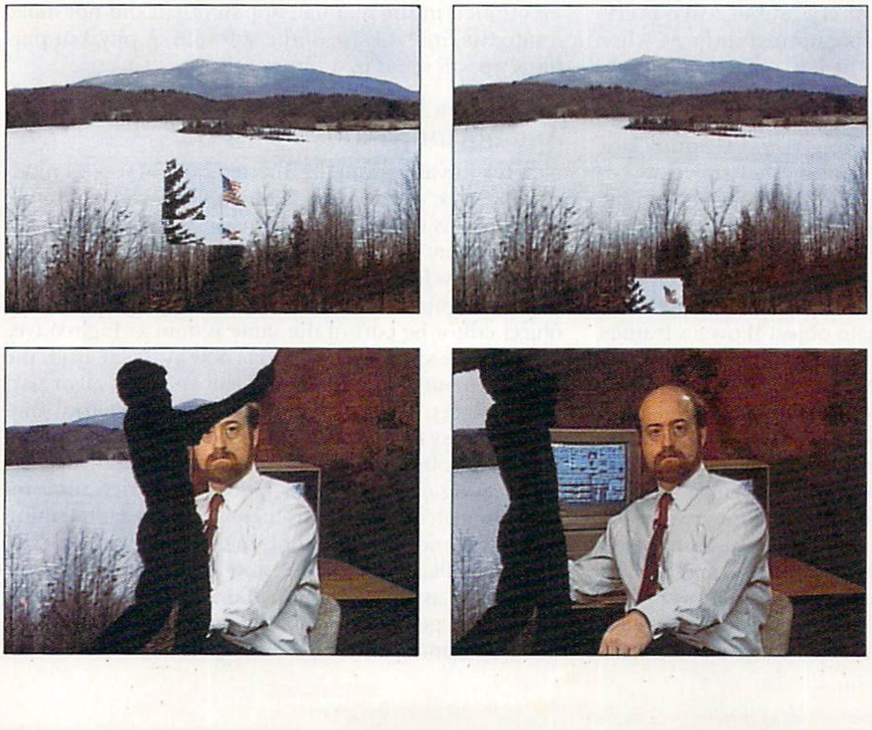


Figure 1. Two examples of new DVEs (digital video effects) available from the Toaster 2.0's Switcher. The "cube" transition (top row) is one of the new Warp effects, while the "golf" transition (bottom row) typifies the sports-oriented new Action effects.

3-D programs on the Amiga have offered ray tracing for some time, previous versions of LightWave did not. (Although object shadows were possible, they were not real ray-traced shadows.) Now, however, you can exercise selective control over ray-traced reflection, refraction, and shadows. (The image created for the illustration on the opening page of this article demonstrates many of LightWave's new ray-tracing features. See the note at the end of the article for more on how the image was created.)

Reflection is responsible for the traditional mirror surfaces that most people associate with ray tracing, but LightWave offers a variable level of reflection. This means surfaces can be only partially reflective and still retain other textural attributes, such as color, image maps, and other characteristics resulting from procedural textures (marble, stone, wood, and so forth) generated within LightWave. For example, consider a desk with a wood-surface texture. By giving it a partial-reflection setting, say 15%, you get what appears to be a highly polished wooden surface that slightly reflects nearby objects.

Refraction defines how light will behave as it passes through a transparent (or semitransparent) object. LightWave allows you to define the index of refraction of an object, which means you can use it to create a wide range of transparent material—anything from air or water to diamond or lead crystal. The degree of transparency is user-definable, as is the index of refraction, enabling you to create an almost unlimited number of transparent materials.

As stated, you can control individually each of the three ray-trace options—shadow, reflection, and refraction. For example, it is possible to turn on refraction and leave shadow and reflection off. This helps speed up image rendering by eliminating unnecessary calculations.

Also, only those objects with ray-trace features (shadows, reflection, and/or refraction) are actually calculated as such when you render. Imagine a scene in which you have a crystal ball on a table. If you define the ball to have a refraction index of crystal but leave everything else to be generated using normal surfaces, when the image is rendered, only the ball object will be subject to the time-intensive calculations necessary to create the impression of crystal. Again, this can save you a great deal of time—something you will appreciate, because ray tracing is a notoriously slow process.

Another significant addition to LightWave is the ability to morph multiple objects. Previous versions allowed only a one-to-one morph effect, meaning object A could morph to object B over a defined number of frames. Now you can chain morph up to 16 different objects. Object A can morph to object B over x frames, then to object C over y frames, and then on to object D over z frames. This feature will go a long way toward creating effective character-style animation.

Adding to LightWave's usefulness is the ability to accept more object formats. Previous versions would load both Videoscape/LightWave and Sculpt formats, but now you can also directly load Wavefront, Swivel 3D, and AutoCAD DXF format objects. I was surprised, however, to see that Impulse's popular Imagine and Turbo Silver formats were not included. But with Syndesis (of Interchange fame) creating the LightWave object loaders for NewTek, it is likely that additional object loaders will be made available in the future.

Rendering resolutions have also been improved. There are now five resolutions available, including a new ultra-high-resolution mode that creates the images at 3008×1920 pixels. While these cannot be displayed directly on screen, you can save the image file to disk and then dump it to film or print it.

LightWave now has a larger capacity for 3-D objects. It will load (if you have enough memory) 65,000 points or polygons in a single scene. This capability is user-configurable, so you can set the amount of memory you need and still leave the rest free for other Toaster modules to use.

You can now also load and save surface textures, which makes it easy to create a library of custom textures. And you can now automatically size image maps to fit, which is a real time saver. Spline-motion control is available for both acceleration and deceleration of moving objects. Image maps can be antialiased, which gets rid of annoying (and unprofessional) flicker when the textured object is seen at a distance. Pixel blending is also available to smooth the pixels of image maps that get so close to the camera that individual pixels become distinct. There are several new procedural textures available, such as Underwater and Dots, plus an improved Wood. Bump mapping has been enhanced, with user-definable amplitudes now an option, and the fog effect has been improved, too.

LightWave will now load Toaster framestores as well as IFF images, an important time saver if you plan on mapping frame-grabbed video sequences onto objects (eliminating the step of loading framestores and saving them as IFF files). You can also clear individual lights from a scene, as well as objects and images. In addition, you can save all the objects in a scene at once, instead of one at a time, and you can also load objects from a scene on disk.

About the only thing missing that I expected to see in the new LightWave is texture morphing. This would have allowed the surface attributes of an object to morph along with its shape. Although the feature is mentioned in the manual, apparently it did not make it into the final release of the software. A pity, but perhaps we will see it in a future release.

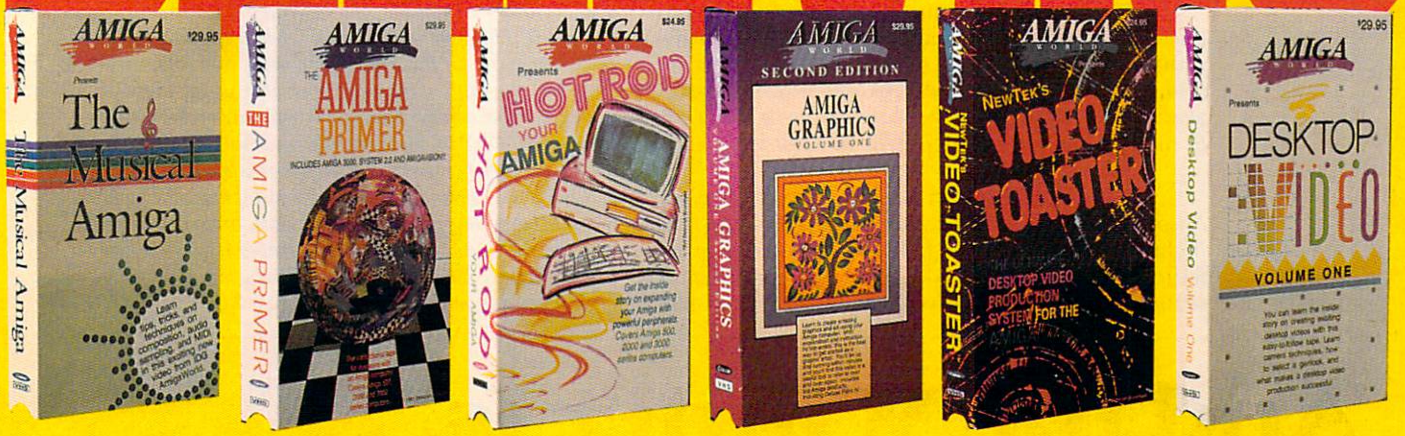
LightWave Modeler, Genlock, and Documentation

NewTek has also given the Toaster 2.0's 3-D object modeler its share of attention. The previous version, in my opinion, was not particularly helpful, because it lacked far too many options needed to create usable objects. Enough new features have now been added, however, so that I can enjoy the convenience of having my primary object editor be part of the same system as LightWave.

There are several new options now available from the Modify menu. You can taper, shear, and twist all or part of an object. There is also a new magnet tool that makes it easy to deform sections of objects, and you can now bend objects—a feature I have found invaluable for creating curved text for logos. Other new tools include morph and skin, and there are a substantial number of new modification tools in the Polygon menu, including split, merge, triple, and align.

Another aspect of Toaster 2.0 that receives a major boost is the genlock. One of the more annoying aspects of the original Toaster package involved its use as an ►

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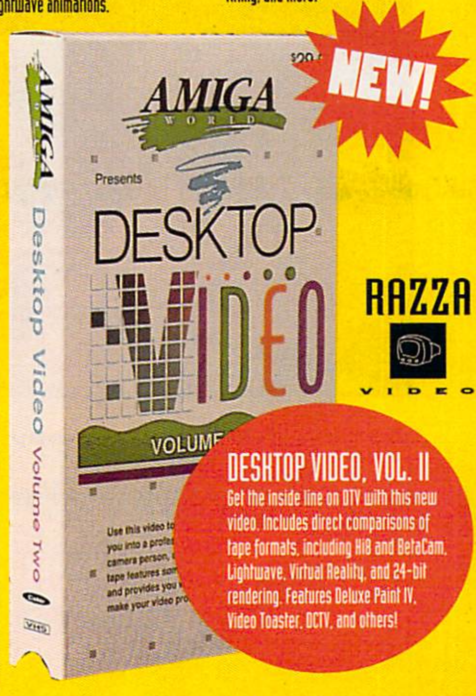
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Amiga genlock. While the Toaster has a fairly decent genlock, it was not much use outside the Toaster environment. This is no longer true.

Included now is a program that will let you employ the Video Toaster as a stand-alone genlock. To use it, first load the Toaster software and then exit back to Workbench. Clicking on the Overlay Genlock icon brings up a requester that allows you to specify which of the four possible video sources (or, additionally, the digital framestore pages) to use as the video source for your genlocking. You can also specify which keys to use to trigger it.

The only drawback to this setup is that any video supplied will have the same requirements as for normal Toaster use. Thus, if it is supplied from tape, it must be time-base corrected.

In terms of overall documentation, NewTek has produced an excellent new manual. It is well organized, with each Toaster software module having its own section, and there is a detailed, cross-referenced index. It also includes a number of very useful tutorials that cover most of the more conceptually difficult features.

Could the Video Toaster be improved still further? Absolutely. One obvious feature that should have been included is support for JPEG compression in the Switcher, ToasterPaint, and LightWave. Since so much of the package works with very large 24-bit image files, JPEG would save a lot of hard-disk space. In fact, because the Toaster software is so large, perhaps NewTek should consider supplying it on CD-ROM. Think of all the fonts, image maps, and objects that could be supplied with the standard configuration!

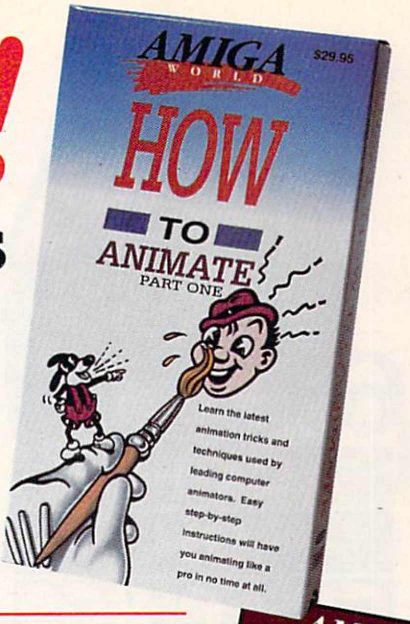
But with those quibbles aside, the 2.0 upgrade is definitely a success and well worth the expense. It is a major overhaul of an already superb package, and the result is one of the finest computer products available. For whatever purposes you may be using the Toaster—video, titling, or animation—you should plan on getting the Toaster 2.0 upgrade. ■

About the Opening Image

The image that serves as the opening illustration to this article demonstrates many of the new ray-tracing features of LightWave 2.0. Throughout the scene, 24-bit images were used as surface textures for the walls, floor, book, and sofa, while the desk and the large vase were generated using LightWave's wood and fractal-noise textures. The picture on the desk is one frame of a 24-bit digital video sequence that actually animates within the scene. Ray-traced reflection is evident on several of the objects in the scene, such as the metal man, the oil lamp's metallic base, the gold metal of the desk, and even the glossy desktop. The lamp's globe uses ray-traced refraction to simulate thick glass. The scene was rendered using shadows at the high-resolution mode. ***—LRW*** □

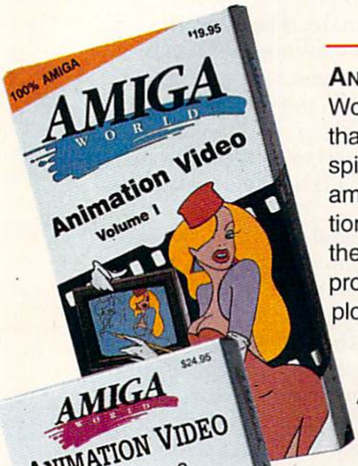
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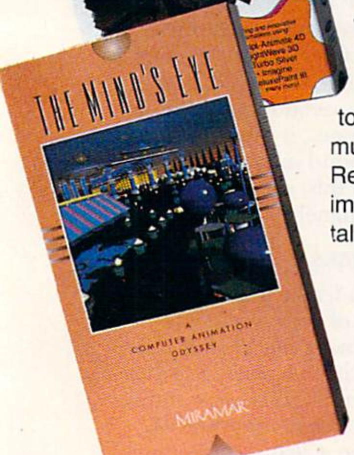


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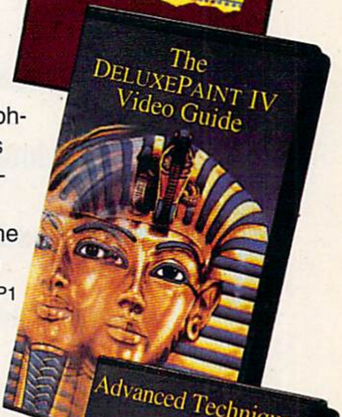
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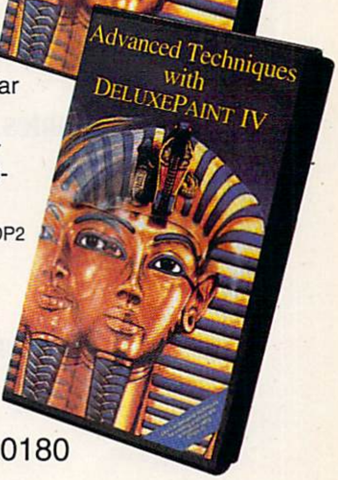
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ACCENT ON GRAPHICS

Light Table Animation

40

A continuing series of tips, techniques, and tricks for creating more imaginative Amiga graphics.

By Joel Hagen

ONE OF THE traditional tools of the animator is the light table, a glass drawing platform over a diffuse light source. This allows one drawing to show through another as a guide. This column will explore freehand animation in DeluxePaint IV (Electronic Arts), with special emphasis on its new Light Table feature.

To follow this tutorial, use the 320× 400 screen format if you have enhanced chip RAM. If you have only 512K of chip RAM, you may need to work at 320×200 to make use of all Light Table features. Build a palette using several families of colors containing light, medium, and dark tones to allow for painting shadows and highlights. Begin by creating a background such as the cartoon landscape in the accompanying illustration. Save this as your spare screen and press the j key to move to the other screen.

Building Character

Now you need a cartoon character to animate. If you have trouble coming up with ideas, or just want to learn more about animation basics, look for Preston Blair's *Animation*, one of the inexpensive Walter Foster art books that you can find almost everywhere. I referred to one of Blair's characters to draw the elephant in my illustration. For a more in-depth look at animation, read *Disney Animation: The Illusion of Life* by Johnston and Thomas.

Use a medium-value color and a single-pixel brush to do a rough sketch of your character. With this as a guide, use a contrasting color to do a finished line drawing right over the sketch. Use the Freehand Line tool, closing shapes so they can be colored later with the Fill tool. When you are finished, make a stencil to lock the final line color, and then clear the screen to remove all extraneous sketch lines. This is your first key frame.

The concept of key frames and in-betweens involves drawing a beginning and end position for one movement a character will make. These are the key frames. In-betweens are the frames drawn between these keys to create the illusion of smooth motion from one position to the other. Before you can "tween," you need to create a second key frame. The Light Table makes this process easy.

For the freehand animator, DPaint IV's new Animation Control panel is a good interface to the main operations. Pressing the Alt-a keyboard combination brings up the panel at the bottom of the screen—as shown in the illustration on the facing page. To turn on the Light Table, select the "lightbulb" icon or press the l key. Your screen should dim when it comes on. If it does not, press Alt-l to toggle the dimmer on and off. Next, click the + symbol on the control panel to add a frame. You should now be on frame 2. Clear the screen by selecting Current Frame from the Clear requester.

To use the first key frame as a reference, click the P button on the control panel. This shows the previous frame dimmed as a reference. Use the first drawing as a guide to make a new position for the second key frame. In drawing key frames, it might help to see the background image under your drawing. To try this, click the S button on the control panel.

"Tween" Tricks

You are now on frame 2 of an animation consisting of your two key frames. Tweening will bring life to your character. Use the control-panel slider to go back to frame 1. Click + to duplicate that frame, which puts you on frame 2 of three. Clear the Current Frame. On the control panel, turn on N and P—Next and Previous frames. Be sure the dimmer is on. You should now see the two key frames, dimmed but visible. If you don't, check to make sure that your right mouse-button

Mastering the basics of DPaint IV's new Light Table feature will make animating a whole lot easier and more fun.

color, the background color, matches the background color (let's call it the "paper" color) that you used in your key frames.

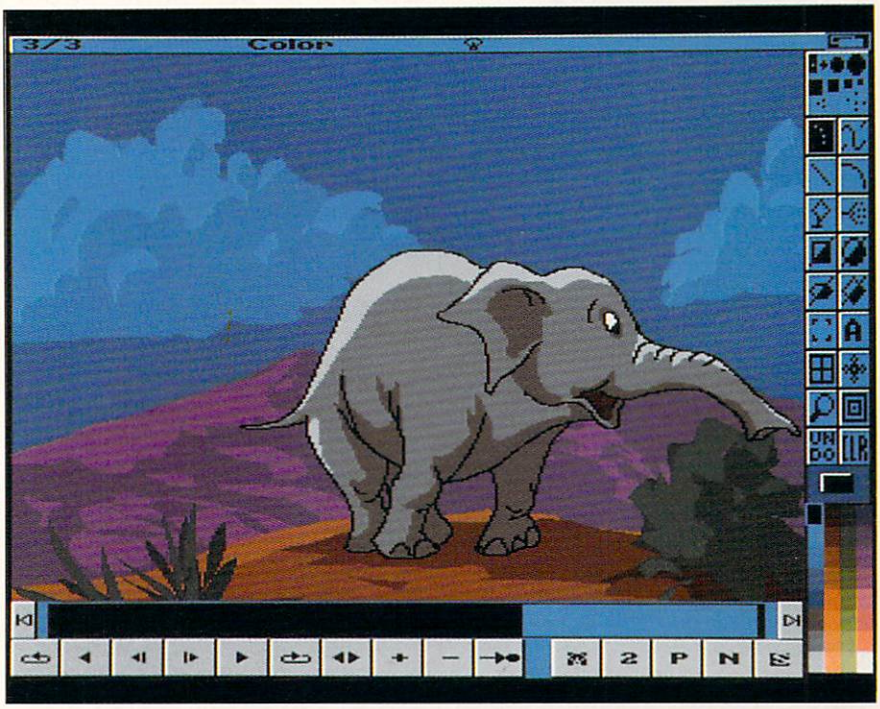
Create frame 2 by carefully drawing a new position midway between the lines of the key frames—hence the term "tweening." If you have trouble distinguishing the lines of the P frame from those of the N, here is a trick. Use BG>FG in the Color menu to change the lines of the P frame to a color different from that of N. With the dimmer on, each image will then be distinguishable as a reference for drawing your in-between frame.

Change the line color of all frames to a consistent color when you are finished. To accomplish this, Stencil-lock the "paper" color, choose the desired line color with the right mouse button, and clear all frames. Remember, however, to save your animation before trying this.

Ping-pong the animation to test your motion. The more in-betweens you draw, the smoother the motion will be. For example, go to frame 3, add a frame, and clear it. Go to frame 1 and do the same thing. You now have a five-frame animation, with frames 2 and 4 blank for tweening.

The P and N buttons always let you see the frames on either side as reference for drawing each tween. To get an idea of the final look, try stepping through the sequence with the spare screen showing and the dimmer off. This outline animation is called a pencil test. (See "Accent on Graphics," #13, Mar. '90, p. 56, for more information on pencil tests.)

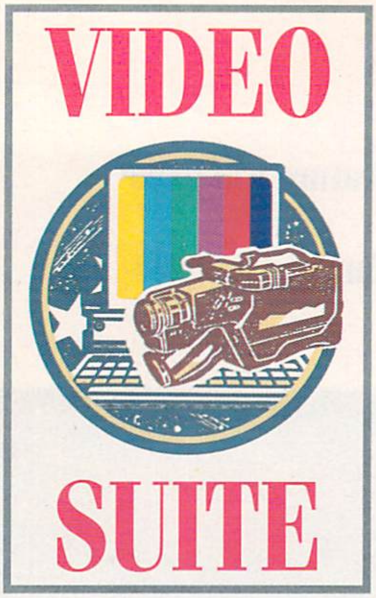
Color the outline animation with the Fill tool, frame by frame. Lay in the base color first (it is medium gray in my elephant example). Using the Filled Freehand tool, give dimension to your character by adding shadows and highlights. Be sure to stencil-lock the line and background colors to protect them.



This is frame 3 of the DPaint IV Light Table tutorial, finished and merged with the background. DPaint's Animation Control panel is shown at the bottom of the screen.

Now draw loose shapes on the character in darker and lighter values as in the illustration. When the colored animation is finished, turn off the Light Table and use Merge in Back from the Spare menu to put the background behind your animation. As a precaution, test one frame first with Merge from the Anim menu. Once you master these basic techniques, endless fun awaits you at the "Light Table." ■

Joel Hagen's credits include work in art, astronomy, science fiction, and software development. Write to him at 10512 Sawyer, Oakdale, CA 95361. Please include a stamped, self-addressed envelope for a reply.



Sync: The "House" Advantage

For the proper timing of all your system's components, you need to create a "house sync" with a sync generator.

By Paulo de Andrade

BEFORE YOU CAN begin to enjoy the pleasures of putting together great visual presentations in your Amiga video productions, you will unfortunately have to master some of the unavoidable—and often confusing—technical aspects of the work. Of these, one of the more crucial is sync.

Basically, there are two forms of sync in the composite video signal: horizontal and vertical. Sync is essential in ensuring that images display correctly on TV monitors and that two or more video components can be used at the same time to perform transitions or effects. Put another way, sync is needed to "time" the system.

By way of analogy, imagine a train moving slowly with all of its doors open. To jump aboard, you would start running alongside and try to achieve the same speed as the train. If done properly, you can jump right in a door, but if you run slower or faster than the train, the chances are you will hit the side of the car, not the door. Sync works in a similar way. If the two videotape recorders (VTRs) are out of sync, you will be unable to perform any transition between them. The video signals simply will not match, causing great distortion in the image.

The same is true when you use a switcher such as *NewTek*'s **Video Toaster**. If it is not timed to the VTRs, you can't execute any effect. Also, if you have an external edit controller, it might not be able to perform accurately if not timed to the rest of the system.

Dedicated Sync Generators

There are many ways to time a system. While many video components have internal sync generators, the most common and reliable method of timing is to use a dedicated sync generator to create what is called the "house sync." Basically, this is the signal used to time all video components in a system.

Quality sync generators used to be quite expensive. But with the introduction of the Video Toaster two years ago, and the widening popularity of desktop video in general on all computer platforms, you can now find good sync generators at very reasonable prices.

(To locate vendors of the products mentioned, see the "Manufacturers'/Distributors' Addresses" list on p. 102.)

An excellent unit for Amiga users is the ***Horita*** **CSG-50** ($379). It generates 4V (volt) composite sync, a 15-MHz frame-timing signal, and composite video (the most common source of sync). Composite video contains the picture's black-and-white information, color information, timing information (horizontal and vertical sync), and blanking. The 4V composite sync, on the other hand, does not provide luminance, chrominance, or blanking.

The CSG-50, however, does much more than generate perfect sync. It also produces black video and two types of color bars—full-field and SMPTE. The color bars generated by the CSG are better than those produced by the Video Toaster, and should therefore be used instead. As an added convenience for those striping time code or control track to tape, the CSG-50 comes with a built-in timer that can automatically switch the video output from color bars to color black after either 30 or 60 seconds. This is a very useful feature for producing tape leaders, because you do not have to edit or switch sources manually. The CSG-50 is also small, taking up little desk space.

Proper Connections

Even though you can daisy-chain the sync signal by using loop-throughs in the equipment or T connectors, the best way to use a sync generator for house sync is to distribute its signal via a distribution amplifier (DA). Basically, a DA takes one input and converts it into many outputs without signal loss. Most major video equipment manufacturers also make distribution amplifiers.

Figure 1 shows a typical house-sync setup, with the Video Toaster as the switcher. The composite video output from the sync generator goes into the DA, which splits and feeds it to a number of outputs—the VTRs, the edit controller, and input 1 of the Toaster. The illustration shows the sync signal connected directly to the VTRs, because most of today's professional VTRs come with built-in time-base correctors (TBCs). If you use external TBCs, the sync signal should be connected instead to their equivalent inputs.

If you use an external single-frame controller, such as the **V-LAN** (***Videomedia***), or another switcher, you should also connect the sync signal to the respective inputs. In fact, any video component in the system should be timed to the house sync. You may find that the sync inputs on various machines have different names, such as Ref Video, Ref In, and Genlock, but they all mean the same thing.

The sync signal should be connected to input 1 of the Video Toaster, because this is the input that the Toaster uses to ►

time all the signals to. If you connect the sync generator to any other input, you will not be able to time your system correctly. Additionally, by using the CSG-50 you will always have black or color bars at your disposal on input 1. You can then change the background color in Toaster Preferences to any other color and still have black available when you need it.

It is important that you use cables of the same length to connect all components to the house sync. Differences in cable length usually result in timing differences, especially if the cables are long. Also, make sure you use quality cables for sync, just as you would for the video connections. Bad cables may have poor shielding that could introduce interference in the sync signal.

Notice in Figure 1 that the recorder VTR is not connected to the house sync. The reason for this is that the recorder usually gets its sync information from the video source. Since all sources are in sync, the recorder will receive perfectly timed signals. Once all the units are timed to house sync, you can perform any transition among them without a glitch.

Figure 2 shows the video-signal connections in the system discussed above.

Another thing to keep in mind is that the signal coming from the sync generator should be terminated at its destination. If you are using the daisy-chain method, the termination should be at the final component. If you are using a distribution amplifier, all units should be terminated.

Most video equipment has an internal terminator that you can connect and disconnect by way of a switch. If your equipment is not so furnished, you can buy an inexpensive external 75-ohm terminator to do the job. On the other hand, some units even have automatic or full-time termination. Check the manuals to make sure you are making the proper connections.

One last point to consider here is that you are likely to encounter situations in which you may want to connect multiple cameras to a switcher, such as when taping or broadcasting live events. Professional cameras have a genlock input, but that does not mean they can output Amiga graphics! The genlock input is used to receive the signal from the sync generator so that that camera can be timed to the others. If the cameras are not timed to the same signal, you will not be able to perform even simple cuts among them. Therefore you must connect the house sync to all the cameras that you are using.

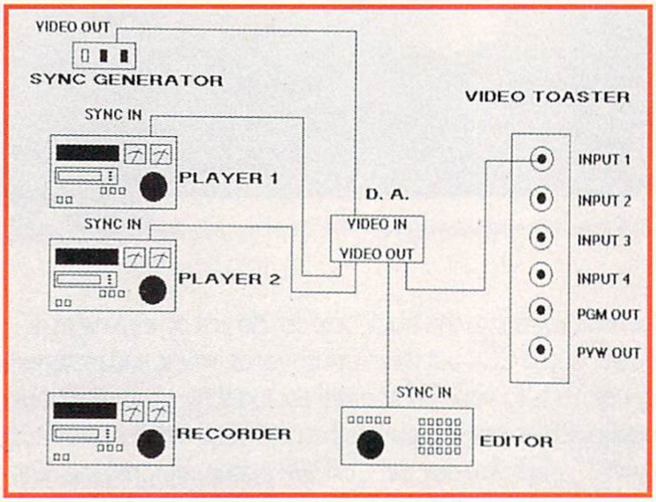


Figure 1. A typical "house-sync" set-up, using the Video Toaster as the switcher.

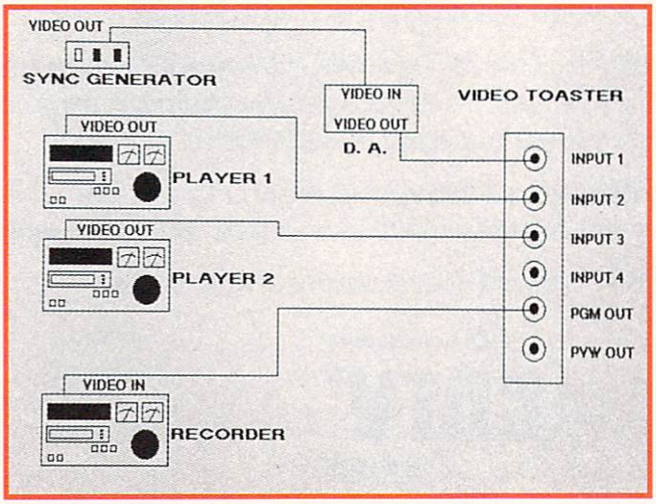


Figure 2. The video-signal connections for the system diagrammed in Figure 1.

Alternative Sync Sources

While I strongly recommend that you use a dedicated sync generator as the source of house sync, financial considerations may dictate otherwise. If that is the case, there are alternatives.

Video cameras make excellent sync sources because the signals are very stable. In this case, the better the camera, the better the signal. You can connect your camera's video output to the distribution amplifier and use it as the sync source. You may use a lens cap to get black or turn on the camera's color bars. It is not very economical, however, to use a new camera as a sync source, because it needs to be on all the time, and this will cause a lot of wear. And a good camera is much more expensive than a sync generator. On the other hand, if you have an old camera with a bad picture tube or chip, it can still serve as a perfect sync source.

I have not tested TBCs with built-in sync generators, such as the **Kitchen Sync** (***Digital Creations***). These should, however, work fine with most VTRs, as they will be timed to the same signal. If you connect one of the VTRs to input 1 of the Toaster, you should have no problems.

Although the Video Toaster has its own internal sync generator, NewTek recommends that you have a stable video source connected to input 1. It is also my personal experience that when a sync generator is connected to the Toaster, the output improves considerably. So, even if you use the Toaster only for 3-D work or as a genlock, you should seriously consider a sync generator. ■

Paulo de Andrade is the president of Kinema Graphics, a broadcast-quality production company that uses MIIs and Amigas in its work. His previous experience includes eight years of network television and six years of computer animation, plus several motion-picture screenplays. Write to him c/o AmigaWorld *Editorial, 80 Elm St., Peterborough, NH 03458.*

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WILDWEST2 #APA2
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Armrack	Gun
Barrel	Locomotive1
Cactus	Railway
Carriage	Revolver
Coach	StraightChair
Flatcactus	Table
Gun+Armrack	

VEHICLES #APA3
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Biplane	Model T
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Model A	

LANDSCAPES #APA4

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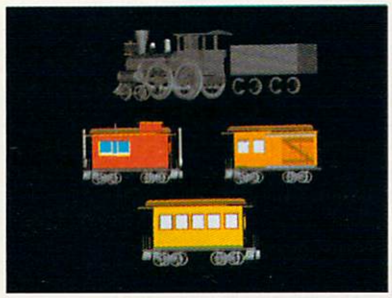
Cyberscape 1.2 generates fractal terrain and saves it as a 3-D object file in either Sculpt 3D /4D, Turbo Silver 3.0, or Lightwave 3D (Video Toaster) format.

Sculpt Terrain 1.0 creates script files for use with Sculpt 4D.

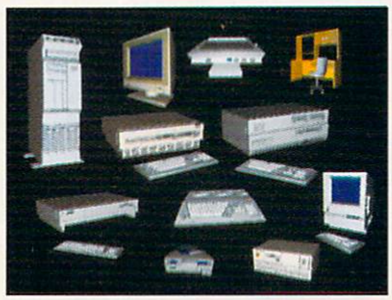
SNACKBAR #APA5
(Imagine format)

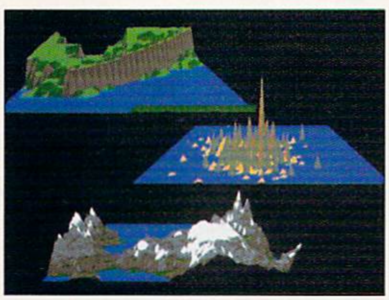
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EggsN'Bacon	Stool













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(In Sculpt format)

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ENTERTAINMENT #APA7
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Piano	Camel
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CHESS #APA9
(In Sculpt and Turbo Silver formats)

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Bcastle	Wcastle
Bking	Wking
Bknight	Wknight
Bpawn	Wpawn
Bqueen	Wqueen
Chessboard	

HONEYBEE #APA10
(Imagine format)

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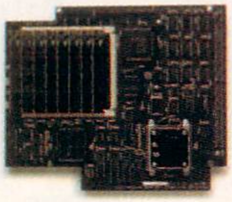
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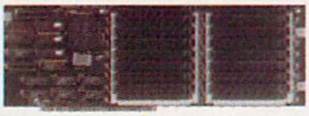
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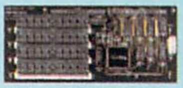
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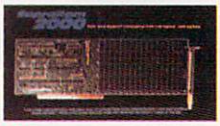
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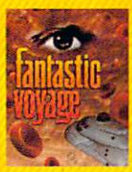




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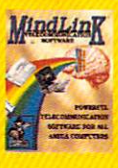
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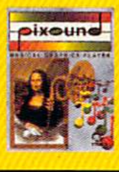
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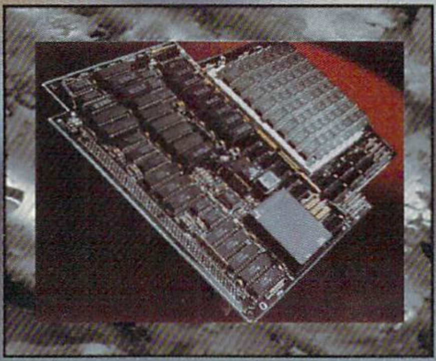
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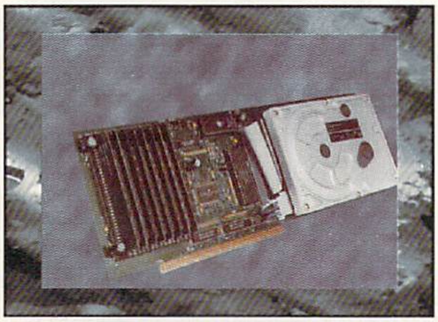
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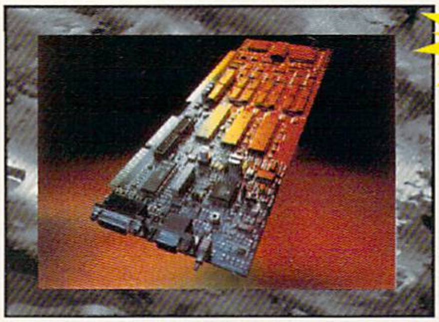
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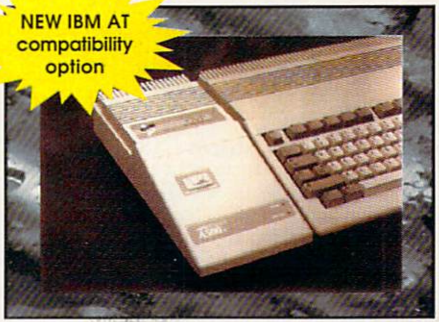
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TSP36: Animation Two beautiful animations, Spigot and Watch. Both of these were created with 3D animation programs and are truly beautiful and smooth.

TSP35: HackLite This is a dungeon-adventure game of the highest magnitude...an absolutely huge world to explore that will task even the most hardened dungeon explorer for weeks on end!

TSP34: MechForce Any number of players can control up to 24 giant robots with lasers, missiles, jump-jets to get you airborne to do battle in teams against each other or against the computer...*highly* addicting!

TSP33: Complete Guide to Programming the Amiga in "C" This four disk set features tutorials, sample programs and inside tips to the special programming needs of the Amiga. Four Stars.

TSP32: Classic Arcade Games Defender and Missile Command--need we say more? Descender is a clone of the classic Tempest.

TSP31: DataBases Contains all flavors of databases. BBaseII is a highly Amiga-tized database, DataEasy is another powerful database. MagMan is specially designed to help you reference articles in magazines.

TSP30: Educational This includes WorldDataBase, DrawMap--which draws detailed maps of countries. WordGame, Metric Converter, Spell2--an ingenious spelling challenger, FastFacts--everything you always wanted to know about our Solar System.



Operation Desert Storm - TSP11

TSP29: King James Bible The complete text of the bible is included on this 3 disk set (counts as 3) with printing and searching capabilities.

TSP28: Bitmapped Fonts This disk contains 67 fonts for the Amiga, all under 25 points in size...a font for every occasion!

TSP27: Octa-MED This remarkable program doubles the sound capabilities of your Amiga from 4 channels of audio to 8! Almost completely identical to MED, this is a truly remarkable program.

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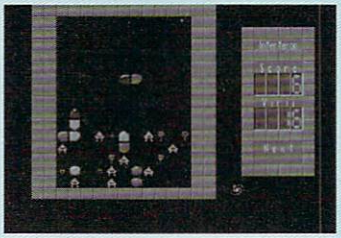
TSP25: SpaceGames Contains MoonBase a very graphically detailed lunar-lander game, SpaceWar-a two player (either in person or over the modem) space battle. Nebula is a 3D world you must defend..definitely commercial quality.

TSP24: Printing Utilities This disk contains a very nice Banner maker that will use any AmigaDOS font with full-color printing. RobsLabelCreator will allow easy creating of labels for your diskettes. PrintStudio allows easy printing of text/graphic images with total control over page numbering/titling, etc.

TSP23: Tobias Star Trek A graphic space adventure where you're the captain of your own starship. Travel through the universe, stop the Romulans and Klingons and complete your missions.

TSP22: 3D Objects This disk contains 18 different vector-objects for use with Sculpt and Imagine. *Some* of the objects include: train engine, synthesizer keyboard, Amiga 3000, space station.

TSP21: Disk Duplicators This disk contains all the best utilities to backup diskettes. Included are XCopyIII and NIB which will backup copy-protect programs. Also includes SuperDuper which is an incredibly fast AmigaDOS copier. Freecopy will *remove* copy protection from many popular commercial programs.



Interferon, featured on - TSP13

TSP20: Board Games Includes Checkers, Dominoes, Clue, Jeopard and Monopoly. Throw away your dice and let your Amiga take care of the details...hours and hours of family fun!

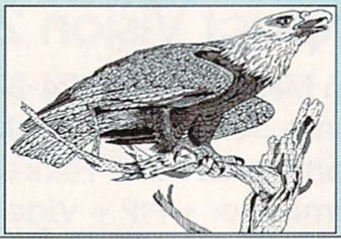
TSP19: PacMan Classics Contains Mazeman, Zonix and PacMan87--all great implementations of the original arcade classic.

TSP18: MS-DOS Emulation Contains PCTask and IBeM, two shareware IBM-MS Dos emulators for your Amiga. Also included are utilities to allow Amiga drives to read/write 720K format MS-DOS disks--Multidos and MSH.

TSP17: Printer Drivers This disk contains over 70 printer drivers for many popular printers.

TSP16: Telecommunication This disk contains two first-class modem programs, NComm and Access. This disk is for the beginner or expert telecommunicator, featuring all the popular communication protocols, including X, Y and Z-Modem. NComm has very advanced script capabilities for performing automated log-ins, downloads and uploads.

TSP15: MED This disk contains the premier music package, MED (Musical EDitor). It will allow you to use digitized sound samples as your instruments and use them in your own songs. Its tremendous editing power makes MED more of a musical word-processor. An extremely well-done program. Many commercial software companies use this package to create soundtracks for their entertainment programs.



Hi-Res Clip Art - TSP12

TSP14: Plotters This disk contains several of the best mathematical plotting programs available for the Amiga. Includes AmigaPlot--a 3-dimensional mathematical function plotter (pictured), Aplot2.0, and PlotXY

TSP13: Tetris Games This disk contains 6 flavors of the classic game "Tetris." Some have artificial intelligence, others a variety of play-styles/skill levels/number of players.

TSP12: ClipArt This disk contains several excellent bitmapped images for use in Desktop Publishing or similar programs.

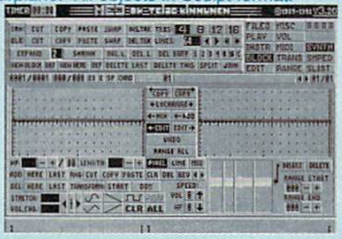
TSP11: Operation Desert Storm: This is a complete Hyperbook-type application that will take you through a guided tour of the recent conflict in The Gulf.

TSP10: Fractals Scenery (pictured) will create realistic fractal landscapes. Genesis allows the creation of various landscapes with user-definable levels of complexity. Also included are various Mandelbrot generators, including TMandel, Mandel-Mountains and FracGen.

TSP9: Utilities #1 IconMeister—an Icon editor with a complete set of editing/painting tools. TJFormat—a disk formatting program that will format disks that AmigaDOS wont. ChartMaster—a graphing tool that allows you to generate and save different graphs in IFF format. Graph3D lets you visualize complex data in 3-D and save the results. StructGen lets you create gadgets, text, bitmaps and window structures and the program will automagically write the "C" source code for you. LabelMaker is a very easy to use, full featured label printer. DoublePrint fascilitates printing of text files on both sides of paper.

TSP8: Clipart Black & White and colorful clipart for a variety of needs including desktop publishing/video. People, holiday related, school items, scrolls, food, monsters, fish, lobsters, symbols and lots more.

TSP7: 3D Vector Objects #2 Books, Early American telephone, barrels, gun, spaceships, lamps, trombone, bugle, skateboard, Lego-Rover, remote control, glider and airplane. All objects in Sculpt format.



MED - Musical Editor on TSP15

TSP6: 3D Vector Objects #1 Lamp, mirror, bed, chair, fire hydrant, lamp post, street lamp, street sign, traffic light, cannon, cannon supplies, rose, fork, spoon, knife and plate. All objects in Sculpt format.

TSP5: Games 3 CrossCircuit is a one or two-player action/logic game that requires fast reflexes. WordSearch will allow you to generate your own wordsearch puzzles. In DrugBusters you rid the streets of cigarettes, alcohol, pills and needles. In Cinco you try to get five X's in a row before your opponent. ColorLogic is an excellent MasterMind type game.

TSP4: Games 2 Dyno-Wars—a strategic checker-style game. Kooties—assemble a bug before the computer beats you to it. BlockBuster is a colorful, well done Tetris-type game. Warrior is a fun shoot'em-up adventure game. MicroMan is a graphic maze game played with a joystick. Battle the computer's armies to take over the planet in Circe.

TSP3: Games 1 Crystal Caverns is an adventure game with randomly generated worlds--you'll never trash the same world twice! Dot2Dot is an adaptation of the classic 2-player connect-the-dot game. PizzaDeliveryMan has you running through the streets to get those pies to your customers. TinyBall is the world's smallest baseball game. Surround-Cycles is a high-speed arcade game, based on the light cycle races from the Disney movie Tron.

TSP2: Sounds Animal sounds, musical instruments and many, many more—43 sound samples in all!

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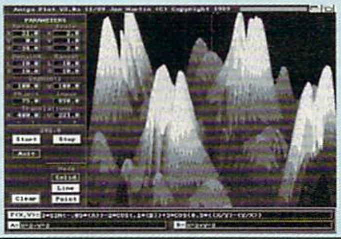
effect with cast shadow.

Special Edition Toolchest

RK1: MegaBall - This disk contains the full-release version of MegaBall, complete with the level editor to create your own challenging worlds to conquer. This game is quite similar to Arkanoid and allows two players with stereo sound and 5 soundtracks! Special RK price, $14.95.

RK2: MachIII - This remarkable utility will allow you to record any mouse click or keypress and play it back as a macro at any time, inside any program. Also provides memory info/clock, alarm, screen blanker, mouse accelerator, mouse-to-menu, sunmouse and window cycling. Special RK price $14.95.

TC33: Measures 1.0 is an incredibly useful utility that will convert any type of measurement to another. DiskLabeler is a database designed for storing and printing 3." disk labels. Jewels is a Tetris-esque game of action and strategy. Switch is a fun board-game. Gfxclipper will allow you to grab any screen and save it as an IFF picture. Softball Manager is a database for storing stats for softball—any number of leagues may be tracked. WBExec allows you to execute CLI commands from within the Workbench. Several Clipart images are also included.



AmigaPlot featured on - TSP10

TC32: Computer Coloring Book is a delightful program for children of all ages—comes with 15 pages of pictures to color again and again. Listmaker lets you make, edit, combine and print lists of words—great for those spelling tests! Moresmooth! scrolls text files smoothly on the screen and allows easy printing. Pocket Billiards lets you choose from several of the most popular pool games with realistic action. Texture allows you to create, manipulate and save (in standard IFF format) realistic fractal textured surfaces. Plague is a monster maze game. Also includes Screen Fader, Snowbench, and FlipBench.

TC31: Calendar Publisher is a professional-caliber calendar maker that is customizable. CrossCircuit is a 1 or 2 player action/logic game that calls for fast reflexes and thinking. APR is a much-needed printer utility. Pizza Delivery Man is a maze game where you deliver pies in your neighborhood. Multiplayer is a single program that will let you see IFF pictures/brushes or playback IFF sound samples. Also includes RAMgauge, 3-D vector objects and Hi-Res IFF brushes of maps and flags of European countries.

TC26: Word Search Maker lets you create word-search puzzles. TimeCalc is useful for anyone who has to calculate hours and minutes (great for adding up times of CD's to make tapes!) Drugbusters is a fun game where you get rid of cigarettes, booze, pills and needles. Wordfinder lets you search binary or text files for a particular word or string (good for getting hints in your adventure games!). KeyClick will add a small audible click to your keys and MouseClick will do the same for the mouse buttons. Seawar is a game between the Allied Navy and the Empire Fleet. Plus Early American 3-D vector objects, digitized sound effects, and a directory program.

TC25: ScreenToIFF captures your screen to an IFF file. PopColors lets you change the colors of your Workbench screen. Warrior is a fun shoot'em-up/adventure game for one or two players. Kaleidoscope is a line drawing program. Blockbusters is a game where you get rid of blocks by pushing matching blocks into them. Amidemo will show-off your Amigas ability to do solid-polygon animations. Microscope lets you examine memory at any location. Also includes Hi-Res IFF brushes of all 50 states and 10 Canadian provinces, nine digitized sounds and two small disk utilities and printer utility.

TC24: TableMaker is a tool for effortlessly building numerical tables. Kooties is a fun game where you have to assemble a bug before the computer beats you to it. HyperText lets you put links in a text file to other text, graphics, sound, animation, ARexx and other applications. The Little Black Book is a wonderfully useful telephone and address book. Color Logic is a MasterMind-type game. Also includes several disk and memory utilities—and some animal sound effects to top it off.



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TC23: Wherels lets you quickly and painlessly find a misplaced file on your drive. Select creates a window from which you can run your favorite programs. MatheMagic lets you find the day of the week for any date in the century, also lets you enter statistical data to be analyzed, graphs data, and solves linear algebraic equations. Pointer List Maker lets you create your own pointers or import pointers from other programs and save them in a disk file. Dyno-Wars requires more strategy and thought than your regular checker board game. Also includes Mr. Monster and Trilion games, 3-D objects, six sound effects and an animation of a pretzel.

TC22: Amiga Checkbook is a fast checkbook manager with check printing ability, budget analysis, and a report writer. AmiCrypt is a file encryption/decryption tool to password-protect any file...a must for security. WaveSyn lets you design musical instruments and waveforms for use in other programs. It also lets you play your keyboard like a piano. Cinco is a game where you try to get five X's in a row before your opponent does. AlterCLI lets you change attributes of your CLI window (width, title, depth, height, location, colors) with a single command—very useful for scripts. Also includes an animation by renowned Amiga-artist Lou Markoya, as well as 3-D objects.

TC21: Circe is a "risk-style" game where you battle the computer to take over the planet. Batchman allows you to execute CLI programs, batch files and ARexx scripts by simply clicking on a gadget. Colors prints color test sheets and assigns RGB values to printer and screen output....absolutely invaluable to achieve the best color printing results. Easyfile is a powerful database for home or a small business. Sprite Editor lets you easily create animated sprites. Plus 3-D fruit objects and five sampled sounds.

TC16: Cyberscape generates complex 3-D vector objects of terrain and saves your objects in Sculpt or Turbo-Silver format. Mathplotter graphs mathematical equations in both 2-D and 3-D. Double Print prints your text files on both sides of the paper. Metamorph, a graphic adventure game, Tinyball—the worlds smallest baseball arcade game and 6 digitized sound effects.

TC15: Labelmaker is a very easy to use label program. SurroundCycles, a high-speed arcade game. Dot2Dot, an adaptation of the classical connect-the-dot game. A tutorial on animation techniques by Amiga-artist extrordinaire Brad Schenck complete with one of his animations. Also includes a collection of clip-art and more animal sounds.

TC14: AmigoFile is a database and address book. Graph 3-D lets you visualize complex data in a 3-D manner and save the results. Spectrogram analyzes and displays digitized sounds. Pteronadonaball—an animation by Lou Markoya. Also includes 3-D Tic Tac Toe, 3-D objects, food clip-art, and sampled sounds.

TC13: StrucGen lets you create gadget, text, bitmap, and window structures and writes the C source code for you. LifeCycles plots your biorhythms. Create spectacular images with Mandelbrots. Look, a CLI utility that helps you find files on your disk quickly and easily. Plus 3-D objects, holiday clip-art, an Amiga Flight animation, drive head cleaning utility, and technical discussion on how AmigaDOS stores information on disk.

TC12: TJFormat formats disks that AmigaDOS normally wont. ChartMaster is a powerful graphing tool. MoreCandy generates an assortment of colorful graphic patterns and allows you to save them to disk. Shark, a game where you have to eat all the little perch you can catch to stay alive. Plus B&W clip-art, spaceship 3-D vector objects, an animation, and Speakeasy (C source code for the programmer to add speech to C programs).

TC11: DiskSalvage will fix corrupted disks and recover deleted files. IconMeister is an advanced Icon editor. AlienDuel is a fast, shoot'em-up game. Crystal Caverns is a colorful, graphic adventure game like the arcade game. Also includes an animation, sound samples, 3D dinner table objects, and Hi-Res monster clip-art.

The AmigaWorld Toolchest

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From p. 24.
the scene is a renderer with a different twist: **RayDance** (***Radiance Software***, $99.95) is a highly programmable renderer rather than a highly interactive modeler like its competitors. As such, it gives you much finer animation controls than most interactive modelers, allowing your objects to move in a more natural manner.

RayDance version 1.0 sports a 2.0 Workbench interface that has been designed not for drawing, but for controlling the rendering aspects of scenes that are described in RayDance scripts. These scripts describe objects (geometric, extruded, lathed, generated, and imported from Oxxi's VideoScape 3D or Modeler 3D), textures, bump maps, lighting, and backgrounds, as well as tweening.

They can also contain variables, if-then-else, looping controls, and user-written procedures to drive an animated set of objects through a whole movie scene. For example, you could instruct a squadron of jets to fly, bank, and twist through a hillscape or an asteroid field, or a tree to grow up from a pot as in time-lapse photography. It's not exactly Renderman (Pixar's renderer/programming language for the Mac), but RayDance is a good step in the right direction.

```
!Exclamations begin comment lines, ?'s print
! messages on RayDance's message window.
? "Make a Green transparent sphere on a
      column\n";

!Camera location
CAMERA'POS = [0,-1300,400];
CAMERA'TARGET = [0,0,300];

! Load bitmaps for textures and bump map
BRICKS_TM : texturemap( "bricks4.ilbm" );
BRICKS_BMAP :
      bumpmap( "brickbumps4b.ilbm" );

STARS_TM   : texturemap( "starfield.ilbm" );
CANALS_TM   : texturemap( "canals.ilbm" );

!Colors
GREEN_AQUA : COLOR(RGB, [0.0,0.9,0.1]);
BLUE : COLOR (RGB, [0,0,1]);
LTGRAY : COLOR (RGB, [0.6,0.6,0.6]);

!Texture maps
STARS_TMAP : texture(plane, STARS_TM, CAMERA'POS, [0,1,0], [1,0,0], 40,40,10, 1,1,
      REPEAT );
CANALS_TMAP : texture( plane, canals_tm, [0,0,0], [0,0,1], [1,0,0], 100,
      100,100, 4,4, REPEAT );

!Surfaces
!Sphere surf    ka  kd  ks    n  km  kr  ir  kb  flags

SPHERE_SURF:
SURFACE(PHONG, 0.2,0.2,0.5,50.0,0.1,0.9,0.76,0.0,TRANSPARENT );

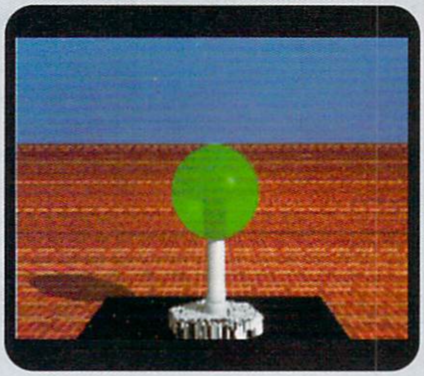
!Dull surface    ka  kd  ks    n  km  kr  ir  kb  flags
MATTE:
      SURFACE(PHONG, 1.0,1.0,0.0, 0.0,0.0,0.0,0.0,0.0,0 );

! Column surface
SHINY :
      SURFACE(PHONG, 1.0, 0.9, 0.8, 25.0, 0.0, 0.0, 0.0, 0.0,SILVER );

!Objects
! Sphere itself

SPHERE ( [0,0,300], 100, GREEN_AQUA, SPHERE_SURF);

! COLUMN
! Build the first object using the an imported outline and
! two lathe statements.  Enclose this object in a NAMED
! boundary in case we decide to do replicas later
COLUMN_OUTLINE : outline( "column_outline.geo", [1,1,4], xz );
```



A sample 24-bit scene from RayDance, created with the accompanying script.

A Script Is Worth 1000 Graphics

RayDance's strength does not lie in letting you draw fancy wire-mesh objects to render. Rather, it provides a set of basic geometric primitives describable in its script language: polygons (with or without holes), spheres, planes, and quadric surfaces (ellipsoids, cones, and so on).

It can also construct algorithmic objects, such as fractal landscapes (using the standard iterating perturbed triangle); trees with forking, twisting, tapering, and drooping control and leaves; Mandelbrot sets; lathed objects (surfaces of rotation); extruded objects (sometimes referred to as prisms); and hierarchical objects (for efficiency). RayDance can also import wire-mesh object descriptions from VideoScape 3D and Modeler 3D; a number are included on the program's four disks.

You can then enhance these objects with surface descriptions, including the standard reflectance (ambient, diffuse, and specular controls), translucence and transparency, and color (in Red-Green-Blue or Hue-Saturation-Value form). The surface color can be either solid or an IFF-image texture map, and you can merge a bump map with it to model surface roughness. Add lighting, ground and backdrop specifications, and you've got a scene.

RayDance can write IFF24, PPM (a Unix format), raw RGB bytes, eight-bit grayscale, or black-and-white wireframe

Continued on p. 74.

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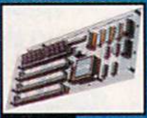
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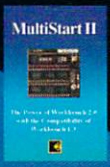
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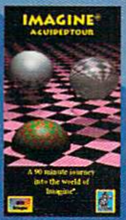
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From p. 70.
files. The manual recommends using ASDG's Art Department Professional (ADPro) to convert these to other formats, and it includes a sample ARexx script for driving ADPro to convert an animation sequence.

Consider an example: The accompanying lamp picture was created from a combination of both objects and textures. The green lamp is a transparent sphere, sitting on a lathed imported column (which came with RayDance). This in turn rests on a lathed pedestal of a different shape, sitting in a rectangular polygon starfield. The brick ground plane uses both texture and bump maps; the starfield and the pedestal use two more texture maps from the RayDance set.

Take a look at the script used to create the picture. It begins with the camera position (RayDance allows control over film speed, lens aperture, and focal length, as well as position), loads some IFF images for textures, and goes on to create some simple colors and most of the texture maps. The names to the left of the colons in the COLOR, TEXTUREMAP, TEXTURE, and other commands are my own names, which I use for referencing these objects in other parts of the script.

```
COLUMN : boundary( [0,0,0] )  ! a named and positioned boundary

! Column base
LATHE( ( [0,0,0], [40,40,0], [40,40,20], [0,0,20] ), 6, -360, 0, [ 2,2,2],
      [0,0,0], [0,0,0], CANALS_TMAP, MATTE, ZAXIS );

! Column proper
LATHE( ( COLUMN_OUTLINE ), 25, -360, 0, [2,2,2], [0,0,19], [0,0,0],
      LTGRAY, SHINY, PHONG ZAXIS );

endboundary

! Starfield courtyard the column sits in

COURTYARD: POLYGON(@[-300,-300,1], @[-300,300,1], @[300,300,1], @[300,-300,1],
      STARS_TMAP, SHINY, PHONG);

!Lighting
! Ambient always   color          dir       kl(base) k2(range)
AMBIENT ([0,0,0], [0.7,0.7,0.7], [0,0,1],       0, 0);

! Starlight   pos              color     radius
STAR ( [5000,-5000,4000], [.9,1,1],   300);

!Ground
! Ground plane texture and bump maps (bricks)
BRICK_TMAP : texture( PLANE, BRICKS_TM, [0,0,0], [0,0,1], [1,0,0], 100,100,100, 1,1, REPEAT
      SMOOTH3 );
BRICK_BUMPS : bump( PLANE, BRICKS_BMAP, MATTE, 1.0, [0,0,0], [0,0,1], [1,0,0],
      100,100,100, 1,1, REPEAT );

! Brick ground
GROUND( PLAIN, 0, BRICK_TMAP, BRICK_BUMPS );

!Background: pale grayish-blue sky to dark reddish blue

BACKGROUND (SKY, [0.4,0.4,0.7], [0.2,0.4,0.6],[0.6,0.2,0.1],0.6);

! render it...

RENDER;

END
```

Objects can be named as well, to be cloned into multiple copies with little memory impact. The script then describes the objects and their positions in a world coordinate system where X is the horizontal (left-right) axis, Y the depth axis (into and out of the screen), and Z the vertical (bottom-top) axis. Finally, it details the ambient light, the "star" lighting the scene, the ground plane and texture, and the sky.

The RENDER statement causes RayDance to generate its 24-bit-color output file, with a HAM preview drawn to the screen. On my 25-MHz Amiga 3000 with a 68881 and two megabytes of RAM, this scene took just over seven minutes to run to an IFF24 file. It would have been somewhat faster if I'd had enough RAM to write the picture file to a RAM disk. (While the program will run on one meg of RAM, the manufacturer recommends using at least four megs and an accelerator.)

To add motion to this, the script could create transformation matrices to move and rotate the lamppost (or a modeled frog with a top hat, say), through a sequence of positions, using a Tween statement to calculate intermediate positions and render the sequence of scenes. At this point, go out for dinner at a nice restaurant; then come home and check out your movie.

GROUP EFFORT

I still haven't gotten much below the surface of RayDance to describe such features as antialiasing, surface perturbation, and more. The package is packed. It comes with a very good 200-page manual, hardware-floating-point and nonfloating-point versions of the program, almost 40 scripts and a number of textures, some sample pictures, and a hard-disk installation program.



YOUR TURN!

With RayDance, your texture maps can follow the contours of your object, and that's pretty impressive. None of the other renderers I've tried have this great feature. The program does seem to run a bit slower than the others, but the end results are just as nice.

Rick Gearhart
DeLand, Florida

Continued on p. 78.

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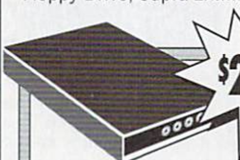
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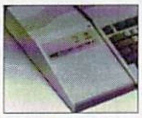
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From p. 74.

All you need further is an editor to build scripts (start by stealing parts of the tutorials, as I did) and perhaps 24-bit viewing hardware or ADPro to see the results in all their glory. VideoScape 3D or Modeler 3D would be required later for creating complex objects to import; scripting individual points on a several-hundred point wiremesh is too awful to think about. Perhaps someone will bundle the set of packages together; it would make a powerful rendering system.

In all, I like RayDance. It's not quite a stand-alone system if you want to do complex, realistic still imagery, but with the extra tools mentioned above, it is the basis of a very good rendering system. If you're planning to do complicated animations, RayDance could save you time and money over an interactive modeler.

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An inside job.

By Sheldon Leemon

IF YOU WANT to add a hard drive to an Amiga 500, you need an external box, right? Wrong! With its **AdIDE40** and **ADIDE44** controllers and **Prima** and **Novia** drive options, ***ICD*** not only allows A500 owners to add a hard drive internally, but also provides two separate mounting options. There's even a version that includes the AdSpeed accelerator, so you can speed up your computer while adding a hard drive.

At the heart of all of these systems is the AdIDE hard-drive adapter, which allows you to connect an IDE hard drive to any Amiga 500, 1000, or 2000. IDE hard drives were designed to attach directly to the PC expansion slots of MS-DOS machines with a minimum of interface hardware, and they don't require much hardware to connect to an Amiga, either. The entire AdIDE board isn't much bigger than the 68000 processor socket it plugs into, and at a list price of $110, it is one of the least expensive hard-drive adapters you can buy for the Amiga. IDE drives are a little slower than the SCSI drives normally used on Amiga systems, but their popularity in the IBM world makes them inexpensive and readily available.

Big Megs in Small Packages

The AdIDE44 version of the controller connects to 2.5-inch hard drives that are commonly used in laptop PCs. Their compact size (they are smaller than an audio cassette) makes it possible to mount them internally to the A500 motherboard with room to spare. Their low power consumption (they are designed to run from batteries) means that they have no trouble operating from the standard A500 power supply.

When notebook drives first made an appearance, they were limited to 20 megabytes and were quite expensive. Now, however, ICD offers complete 2.5-inch Novia drive systems in 20-, 40-, 60-, and 85-meg sizes, at list prices that range from $271 for the Novia 20 to $710 for the Novia 85. This means you can now get a 20MB internal hard drive for about the same price as I paid for my first external floppy drive.

While 2.5-inch drives have come down in price and gone in up storage capacity, they still hold less and cost more than full-size drives. For those who want more bang for their buck and don't mind modifying their computer somewhat, ICD offers the AdIDE40, which connects to such 3.5-inch drives as the Quantum LPS series (the Prima option). The combination of AdIDE40 and a Quantum drive currently costs $430 for the 52MB drive and $584 for the 105MB model. The LPS drives draw little power, so you don't need a replacement power supply to use them.

The only way to install the drive internally, however, is to remove the internal floppy and mount the hard drive in its place. You can compensate for the loss of the internal drive with the Shuffle Board, which is included with the Prima system and changes the first external drive to df0:, the device designation normally reserved for the internal drive.

Even without the Shuffle Board, however, all of the AdIDE controllers enable you to boot from an external drive, as well as an internal one. I learned this the hard way when I inadvertently left a bootable disk in the internal drive after installing the 2.5-inch Novia drive. Imagine my shock when the computer booted a game instead of Workbench, and there wasn't even a disk in the internal drive! Unfortunately, there's no way to disable this feature.

Installation of both types of AdIDE controllers is a snap for anyone who has opened the case of the computer, and fairly simple for those who haven't. Once you've unscrewed the case and shielding (you'll need a number 10 star-head Torx driver to open the A500), gently pry out the 68000 processor chip, plug the chip into the interface board, and then plug the board into the socket. The process is the same for the AdSpeed IDE, except for plugging in the processor chip, because the board comes with its own high-speed processor.

Next, you need to mount the drive. With the Novia 2.5-inch drive kit, that's as simple as peeling the backing from the tape pads on the mounting feet and pressing the drive onto the motherboard. The entire Novia installation took less than ten minutes, and it worked the first time. Installing the Prima 3.5-inch drive is a little harder, but not much. You've got to remove four more screws that hold the floppy drive, unplug the power and logic cables from the drive, and replace it with the hard drive. To install the Shuffle Board, you remove one of the CIA chips, plug it into the board, and plug the board into the socket.

If you buy the complete Prima or Novia kits from ICD, the drives come formatted with the Workbench software already installed. Even if you buy the controller and drive separately, ►

Table 1. DiskSpeed 4.1 results for AdIDE and AdSpeedIDE controllers, with a 2.5-inch Novia 20 drive installed in an Amiga 500 with one megabyte of chip RAM (WORD-aligned buffers).

	AdIDE	AdSpeedIDE
.5K Buffer Read	69456 bytes/sec	81626 bytes/sec
.5K Buffer Write	79158 bytes/sec	96359 bytes/sec
4K Buffer Read	171008 bytes/sec	171813 bytes/sec
4K Buffer Write	168488 bytes/sec	165025 bytes/sec
32K Buffer Read	402136 bytes/sec	423338 bytes/sec
32K Buffer Write	417792 bytes/sec	411126 bytes/sec

however, the graphically-oriented partitioning and formatting software is easy to use. In fact, if you accept the default settings of one large bootable partition, you can perform the whole operation by pressing one button.

There is good documentation for both the hardware installation and the formatting software. Unfortunately, instructions for all of the AdSCSI interfaces are mixed in with those for the AdIDE products, which means you must do some work to extract the information you need for your machine. More disassembly diagrams would be helpful, also.

On the Test Bench

The performance of the Novia 20 drive that I tested was very good. Even when installed in a stock one-megabyte Amiga 500 with no expansion RAM, it turned in very respectable DiskSpeed results (see Table 1). The noise from the drive is noticeable, particularly considering that A500s are just about silent, but the Novia is actually very quiet when compared to other hard-drive systems.



YOUR TURN!

I installed an AdIDE Prima 105i Quantum LPS in my system some time ago, and it has been working quite well to date. The installation, although it required disassembly and chip pulling, went smoothly. The partitioning software was just wonderful compared to GVP's and Supra's. With a 1.3KS ROM (highly recommended), the drive was recognized without a mountlist or entry in the startup-sequence. I've had no data errors so far and haven't even reformatted the drive since I got it. My only complaint with the AdIDE system is that the A-Max driver freezes when accessed on the Mac side and is thus useless. The rest of the system works great.

Andrew Nelson
Green Bay, Wisconsin

I didn't run into any compatibility problems, and to ensure that you don't either, ICD lets you disable the drive completely by holding down the left mouse button at boot time for those games that just will not run in a one-megabyte system if a hard drive is attached.

The drive uses about 80K of memory for buffers, but if you are running tight on RAM, you can disable the buffers and reclaim their memory by holding down the right mouse button when you boot. Because of the physically small size of the AdIDE board, there isn't much danger of overlap with other internal boards such as Kickstart switches, chip RAM enhancers, or ICD's own Flicker Free Video board. It may, however, be difficult to stack the AdIDE on top of accelerator or memory boards that also plug into the 68000 socket and still get the case back on.

The ADSpeedIDE boards combine a hard-drive interface with the AdSpeed accelerator that I discussed in Part 3 of the A500-expansion series of articles (*AmigaWorld*, Apr. '91 p.38). This accelerator uses a 68000 processor running at double the normal 7.16-MHz clock speed, along with 16K of high-speed cache memory, to effectively double the rate at which programs are executed. Although the board is very compatible running at the higher speed, you can swap back to normal speed with the included software or by connecting a hardware switch to jumpers on the board.

With this installed, you can even change speeds while the computer is running, meaning that you can load a copy-protected game at normal speed and then accelerate play after you've passed the timing-sensitive loading sequence. Because the IDE interface is a nonDMA design that uses the processor to transfer all data, the AdSpeedIDE board even boosts the drive speed by up to 15%. (See Table 1.)

If you want to add a hard drive to your A500, but don't like bulky expansion boxes, the AdIDE controllers and drives are the natural choice. In fact, they provide a low-cost, high-performance alternative for anyone who wishes to add a hard drive. (Though I haven't tried it, they should even work with CDTV.) As the cost of 2.5-inch notebook hard drives approaches that of their 3.5-inch cousins, the combination of convenience and low price that the Novia series offers may soon be hard to beat. ■

Circle 71 on Reader Service card.

THE GAME PRESERVE

The Adventures of Willy Beamish

By Peter Olafson

If *Dynamix*'s games for the Amiga were stocks, we'd all be rich as Bill Gates: They just keep getting better. With its extensive animation, **The Adventures of Willy Beamish** ($59.95) is the best yet.



How much trouble can you get into as a nine-year-old?

While animation took a back seat in previous Dynamix games, with Willie B (a nine-year-old with puppy-dog eyes and a trace of a tail), his family, friends, and not a few enemies, it's been moved up front. If you want to pick up an object, Willy himself ambles over and picks it up. If you want to move to another room, Willy boy is there to do the walking. You don't have full control over the character as in Sierra's Quest games—hey, nobody can control this kid—but that wasn't the purpose. With your character on screen, this elaborate cartoon carnival feels less removed than its predecessors; it's not just a story with a jazzy interface.

Willy really is a character, too. It's the best of times and the worst of times: the last day of school with Willy in detention after his frog (Horny) assaulted (and dewigged) the principal. (There's also a matter of that "C" in Music Appreciation on the report card waiting at home.) He can sneak out and intercept the mail—if he has the right stuff and the right timing—but that means meeting Spider in the bathroom. (Then again, *that* means you get to see the school nurse. Heh-heh!)

I'm a little afraid of saying too much about the plot. (Plots, actually, as there are lots of different ways for Willy to go.) Let's just say that after a fairly ordinary Day One—Willie does chores—things begin to get a mite...well, odd. For example, The Simpsons' Babysitter Bandit is an angel beside the creature the Beamishes hire. And let's say that while the folks behind the counter at the Slice of Life pizza parlor make the pies, Willy cuts the cheese.

For the most part, Willy Beamish doesn't hesitate to stretch the bounds of weirdness, incorrigibility, or questionable taste, a delightful trend that's carried over into the documentation, which includes a National Lampoon-style version of Willy's notebook containing the inscription "Nerds play Police Quest." (Hey, I thought Dynamix was a *Sierra* company.)

The challenge is to raise an entertaining amount of useful hell while remaining in the good graces of your parents on the Trouble Meter (so Willy doesn't get sent to cadet school), earning $2500 to get to the Nintari videogame championships, and saving the city of Frumpton from the best-laid evil plans of a sweetener-maker. (She shares a surname and jawline with a certain "rhymes-with-rich" hotelier.)

The game system is almost identical to that used in Dynamix's two earlier games—all mouse, windows, and menus—and it's easy as ever to use. However, Willy B is *much* more extensive than its predecessors, checking in at 12 disks (close to ►

Crib Notes

By Peter Olafson

The girl with the treasure chest is back. In *Elvira II: The Jaws of Cerberus* (Accolade, $59.95), the double-D-cup scream queen is in trouble again—held prisoner in her studio by...a dog. Well, it's a really *big* dog, see. Extra heads. Large teeth. Several stories high. The basic puppy-from-hell sort of thing.

Actually, before you rush off to save Ellie, there are a couple of much-needed items out there in the blue night. One is a rock (off to the right of the path), and the other is a clover (under the sign).

You'll need the rock almost immediately, as you don't have a key to the security shed. Hmm, looks like there's been a fight here, or at least someone's had a digestive problem. The guard in the closet is long gone, but you'll want his jacket and hat—not +2 plate mail, but better than nothing—and that key on his belt for the security panel on the desk. The car in the parking lot deserves a once-over, as well—notably the trunk.

Then on into the studio lobby. Some of you are being too hasty here (probably because there's little of use) and are forgetting to look in all possible directions in all possible locations. There's an elevator catty-corner to the bathrooms that takes you up to the studio offices—also known as Reagant Central. Pay particular attention to Elvira's dressing room. (Knew you would anyway!) Do avoid the costume department just now, however, or at least save your game before blundering in.

It's hard to give hints here—and in many sections of this game—without just listing items; the key trick is inventory control. An awful lot of stuff in E2 can be picked up

Continued on p. 92.

To locate the vendors of the games reviewed, see the "Manufacturers'/Distributors' Addresses" list on p. 102.

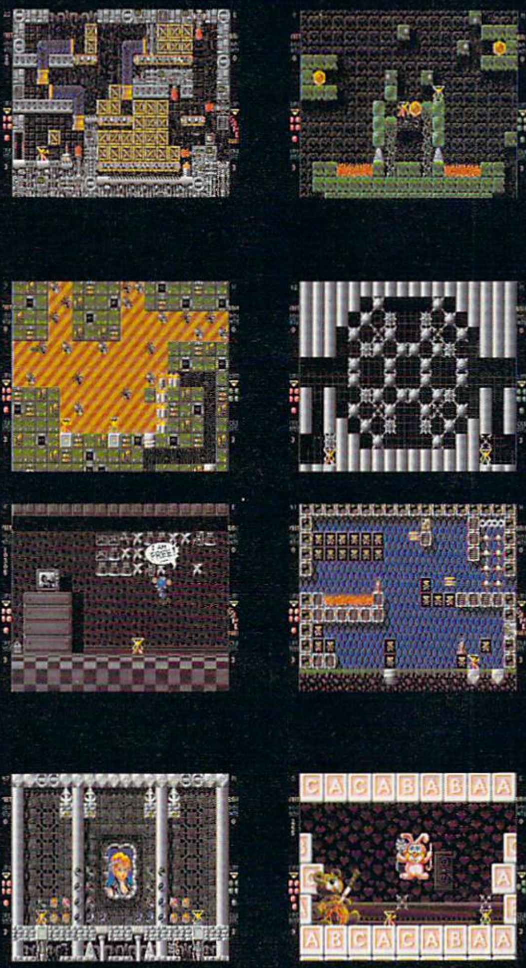
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10 megabytes when installed on the recommended hard disk). This is a positively elegant, toney game. The 32-color backgrounds, with their slightly-faded, watercolor look, resemble artists' renderings. The music is superb (as in Willy's forerunners), and more than one theme had me bopping around my office like a total dance-machine idiot when I should have been playing the game. (Great bass line!)

The animation is pretty good, too. While the larger and more complex scenes could be smoother—on a 68000-based Amiga they have the telltale bump-bump-bump of frames going by—those on a smaller scale are fluid and charmingly nuance-filled, showing the influence of such directors as Tex Avery and Chuck Jones in the right places (overblown reactions and streaks of color behind people in a hurry).

Surprisingly, one of the biggest pleasures is "reading" Willy—summoning the magnifying glass (right mouse button click) and poking around the many description-filled locations. This isn't the token gotta-say-something filler that attends some computer games; instead, it is elaborate text, revealing of character and often quite funny. (Turns out Mom Beamish is quite the little Yuppie.) You can also run the trains in the attic, listen to the answering-machine messages, reset your sister's scale, or play an inane video game called Monster Squad. And this is just at home. We've come a long way from Little Computer People, eh?

Quibbles? Well, loads still take a while, though response time for summoning the inventory is much improved. And frankly, I could do without the ghost of Grandpa Beamish turning up to warn Willy when he's on the verge of doing something bad. It feels like a sort of politically-correct, "Don't try this at home, kids" addendum that's antithetical to the game's ethos (and to the try-anything, adventure-gaming spirit). C'mon Dynamix, Willy's a brat, but he's not eating Draino or anything. Lighten up, eh? Otherwise, I had an absolutely wonderful time in the world of Willy B.

Sequel? Please!

Populous II: Trials of the Olympian Gods

By Jeff James

In the beginning, Bullfrog created Populous. Using its transparent interface, you divinely intervened in a world of simulated computer humanity, with a variety of supernatural powers to assist your own followers while simultaneously hindering those of your opponent.

As a sequel, **Populous II: Trials of the Olympian Gods** (***Bullfrog/Electronic Arts***, $49.95) transports you from Populous I's abstract worlds to the mythological world of ancient Greece. As one of Zeus' many illegitimate offspring, you demand acceptance into the Greek pantheon of gods. Zeus decrees that to reach your goal, you must emerge victorious in combat against 32 of the Pantheon's most powerful deities, ranging from the plodding Prometheus to mighty Zeus himself.

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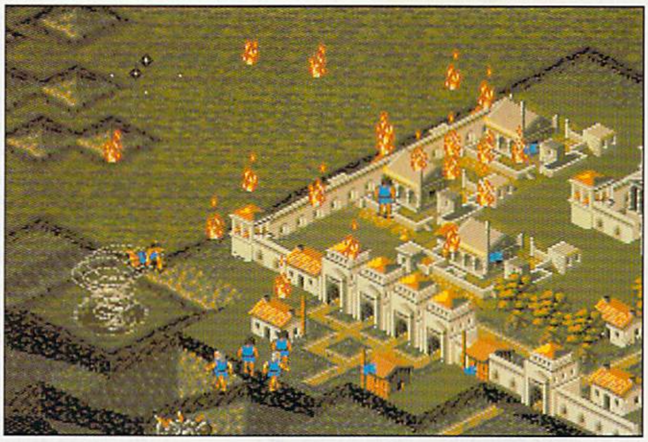
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flame, deadly plagues, erupting volcanoes, and hurricane winds; or you can send ancient Greek heroes such as Hercules, Perseus, and Odysseus rampaging through your foe's territory.

Not all powers are destructive; some allow you to erect walls around your cities, plant trees, pave roads, and even grow fields of blossoming flowers to please your population. There are nearly three dozen powers that can help you, although it may take some time for all of them to be available to you. Amazingly, many of these effects can be active simultaneously, allowing devastating combinations of pixelized destruction.

Populous II supports all Amiga models that have at least one megabyte of RAM, and it is fully hard-disk installable. Copy protection is manual-based, and you can save games in progress. Although it operated flawlessly on an Amiga 500, I did have some problems running the game on an A3000 with AmigaDOS 2.04. Sometimes the screen would quickly alternate between two separate game screens. At other times, the game simply locked up, forcing me to reboot.



Greek mythology class was never this much fun.

Even with the infrequent problems, Populous II is simply a masterwork. If you only buy one game this year for your Amiga, make sure it's Populous II. (In addition to its excellent work on Populous II, Bullfrog continues to support Populous I, both with expansion disks and now the **Populous World Editor**, which lets you create custom worlds. Available from ***Electronic Arts*** for $39.95, the World Editor runs in 512K and supports hard-drive installation.)

ELF

By Graham Kinsey

As Cornelius, the Elvan hero of **Elf** (*Ocean/Electronic Arts*, $49.95), you must rescue your girlfriend from the villain Necrilous the Not Very Nice. Fortunately, that's as unoriginal as the game gets. You guide Cornelius through eight huge levels (many with multiple parts), solving numerous puzzles while combating men and monsters that constantly attack. Every opponent you eliminate leaves behind either a valuable token that gives you bonus points (when you finish the level) or a heart

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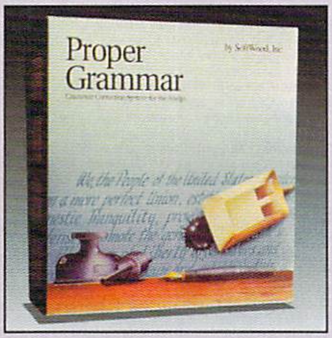
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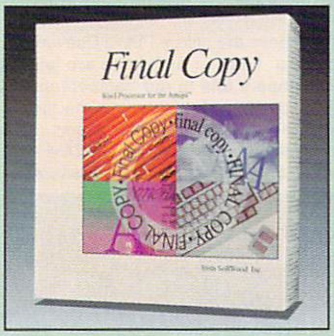
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DD79abcd: Amiga "C" Tutorial - This is the most comprehensive C language--*Amiga oriented*--set of tutorials available. Includes full working examples, source code and an incredible set of lessons. Included are full discussions and examples on every topic on Amiga programming. 4 disk set, counts as 3.

NEW DISKS

VO9: 24-Bit - Contains Rend24 which allows you to proof Toaster-generated 24-bit animations. Also contains utils to convert IFF's to IBM VGA/Windows readable format. Also contains latest release of JPEG file compressor .

VO8: CompuGraphic Fonts - Contains 2 clipart-style fonts and 4 actual typefaces for use with WB2.04 and it's Fountain utility. Great for desktop publishing and/or video projects.

VO7: StarTrek Objects - Contains the USS Reliant, NCC-1701D (the Enterprise from Star Trek:TNG) and a Ferengi Marauder ship. Also contains a fully detailed Porsche 911 and Apache Attack Helicopter. Imagine format.

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V02: Stillstore - Used to create the "over the shoulder" graphic inserts ala the 11:00 news.

V01: Graphics - Picbase will let you view and track ALL of your IFF pictures over all of those floppies! Freepaint is a Deluxe-Paint workalike. Agraph is a powerful utility to produce snazzy graphs.

FD79: Addams Family Quiz - They're delightfully creepy and spooky and now they're in your Amiga! Classic digitized graphics and sound samples make this a real crowd-pleaser. Wait till you "talk with Cousin Itt!"

FD78: Potpourri - Lothian is a great Ultima-type adventure game with great graphics. Rocky is a remake of the classic Boulderdash.

FD77: Arcade Series - Galaga'92 is a clone of the arcade game of the same name with several gameplay enhancements--with smooooth, sharp graphics, it's better than the origional! Pharaohs Curse is a clone of the origional C64 classic. Diplomacy is a beautifully computerized version of the Avalon Hill board game--conquer or be conquered! Galaga requires 68020+

FD76: Catacomb - is a full graphic adventure game with beautiful graphics and a very slick icon/mouse driven interface.

FD75: Arcade Series - Descender is a clone of the classic arcade game "Tempest"; complete with vectorized graphics. Tanx is the classic battle of trajectories and inertia between two tanks—incredibly well done! Search is a maze game unlike any other—included is a level editor too. (Tanx requires 1 meg chip memory=Fat Agnus)

FD74: Arcade Series - RingWar is an "Outer Limits" clone with vectorized graphics. MotherLode is a "Lode Runner" clone with 50 levels! In BlitzTanks, they're coming at you from all directions!! Call in air strikes and use your heavy artillery to survive!

FD73: Arcade Series - Intruder Alert! is a MULTI-level "Berserk" clone. Features smooth gameplay, great graphics & digitized sound f/x.

FD72: Sword of the Warlock - This is a demo version of a great public domain graphic dungeon adventure game. The adventure spans three diskettes and allows two players to go adventuring. The game has a 'Bards Tale' feel to it. Three disk set, counts as 2. Requires 1 meg of RAM and 2 floppy drives or HD.

FD71A&B: Star Trek: TNG Trivia Challenge - So you think you know The Next Generation, huh? Complete with fantastic sampled sounds and digitized images, this game even looks and sounds like a genuine Star Trek terminal! VERY thorough and complete! Counts as 2 disks.

FD70: SpaceGames - Contains AmiGoids, >finally!< an Asteroids game that takes advantage of the Amiga—totally configurable with great sound and grpahics. In Cosmostruction the object of the game is for each Cosmostruction team to acquire the most points while construction energy ducts between the space station and planetoids.

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FD67: Arcade - Includes Llamatron a well-done 'Robotron' clone. Hate is a "terrific" commercial grade Zaxxon clone with multiple levels/worlds and smooth diagonal scrolling...a 10!

FD64: Games - Wizzy's Quest - a "great" 50 level game with great graphics, Cubus - a 3-dimensional Tetris type game (rotate and move in 3 dimensions). Husker Du - Colors and pattern rather than shape in this Tetris-esque game; 5 screens and 3 levels of difficulty. Requires Fat Agnus (1 Meg of Chip)

FD62: PomPom Gunner. An extremely smooth and well done World War II gunner simulation. Requires 1 megabyte of memory.

WB114: Fonts #4 - Contains 36 bitmap system fonts.

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WB109: VerseWise - Display, search and output The New Testament to text files or your printer.

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WB106: Home Manager - This is a great all-in-one address book with an autodialer/notepad/to-do list/appointment scheduler/home inventory database and phone number dialer.

WB105A&B: Workbench 2.0 Extras #2 - See the top right of page 2 for more info on these priceless utilities to make Workbench 2.0 fly!

WB104: GrabBag - Q&A Trivia (requires AmigaVision) is a trivia game for 1/2 players...add your own questions to customize the difficulty level! Sysinfo is great for telling you how fast/slow your computer is, what boards are installed, chipsets, etc. AmiGazer will plot stars in the heaven from any position on earth complete with magnitudes and constellation identification.

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DD82: Unix - Contains a working demo of Minix - a Unix workalike. Minix is system call compatable with V7 of Unix.

FUN DISKS

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FD6: GAMES! - This disk is chock full of games including; Checkers, Clue, Gold - A new slide the pieces puzzle, Jeopard - An enhanced version of Risk, RushHour - Surprisingly addicting, and SpaceWar - Best described as a cross between Combat-Tanks and asteroids.

FD7: Pacman - This disk contains several pacman type games including; PacMan87, MazMan and Zonix.

FD9: Moria -. This has great graphic controls, multiple spells, similar to Larn and Hack. Play time several weeks!

FD10: HackLite - A dungeon adventure game. Considered a must-have classic. This is the second release of this game on the Amiga. Great graphic interface. Play time several weeks!

FD11: Las Vegas and Card Games - Las Vegas Craps - The best Las Vegas Craps simulation every written for any computer. Contains extensive HELP features, Also Thirty-One,VideoPoker and more.

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FD14: Dungeon Master Hints and Arcade Games - DM maps, spells, item location, and hints and more, also on this disk, Hball - an arkanoid/breakout type game, Trix - a Qix type clone.

FD17: Educational Games - This disk includes several games for the younger members including geography, math, science, and word games, also includes Wheel of Fortune.

FD20: Tactical Games - MechForce(3.72); A game that simulates combat between two or more giant, robot-like machines. Simple words can't begin to give you the feel of piloting a 30 - 40 foot tall, fire breathing, earth shaking colossus that obeys your every whim.

FD26:Arcade Games - Marble_slide is a commercial quality game—similar to a Lucas game named PipeDreams, excellent playability and entertainment. Mutants—a small version of the same arcade game. SuperBreakout is a Pong/Arkanoids type game.

FD27: Arcade Games - This disk is loaded with some great games. Includes, Raceorama a great racing car game with ten different courses, MiniBlast a helicopter gunship type clone, Shark in the same class as froger, and SBreakout the original breakout with more.

FD29: Shoot'em up's - WWII - you're the pilot of a WWII plane flying through enemy territory, you've just been spotted, good luck on you mission, SpKiller - try and penetrate enemy lines with this game, and Retaliator - another great game.

FD31: Games! - Air Traffic Control - a good ATC simulation, Black Jack Lab - a full featured set of card games, ChessTel - play chess with your friend in distant and remote places with this game and a modem, labyrnth - a well done text adventure game (like an infocom game), and MouseTrap - a 3d maze game.

FD32: Flight Simulator - An instrument flight simulator for a DC10.

FD33: Arcade Games - Ffreddy a Mario Brothers type of game, Gerbils a target practice game, PipeLine a German interpretation of Pipe Dreams, Tron a light cycles version, and Wetroids a wonderful version of asteroids with a hilarious twist.

FD35: Omega (v 1.3) - A new outstanding cungeon and outdoors adventure game in a similar vein as hack, rouge, and moria. This version is considerably faster and better that all previous versions. Play time several weeks or months.

FD37A&B:Tactical Games - Empire (2.2w) This great game comes highly recommended. With a full-graphic front end.

FD38: Games - Cribbage Master - A great cribbage game and tutor, Spades - a well done card came, ChineseCheckers - A computer version of this classic, Puzz - a slide piece puzzle game and construction set.

FD39A&B: Star Trek, The New Generation - This is a, completely different version of Star Trek than that found on FD12. This one was created by the German author Tobias. Now with English instructions. Excellent!!! Counts as two disks. Requires 512k

FD44: Game - Mechfight is an out of this world role-playing adventure comparable to hack and moria. The setting, interplanetary colonies and space stations. In your quest to explore the world, take time out to liberate bad guys of their most valuable possessions, engage in a mortal combat or two against robots and alien life forms, pick up a new Amiga 9000. Most of all, don't forget to stay alive...

FD49:Chaos Cheats - This disk contains an everything you wanted to know about cheat set for Chaos Strikes Back, including full maps, spells, object locations, super characters and more.

FD50: Submarine Game - Sealance, one and a half years in the making, this is an outstanding submarine tactical game. Commercial quality, highly recommended.

FD52: Classics Games - PetersQuest a well done Mario brothers type of game, Jymbc a two player missile command clone, and Vstank a tank commander game.

FD53: Great Arcade - On this disk is a wonderful implementation of the ever popular classic arcade game Defender. Also contain Air Race a WWII flying ace arcade game, and Psycoblast new creation idea game.

FD56: Arcade - Includes SpaceWar. HueyRaid is a well done helicopter arcade game. PowerPong's a great expanded pong game.

FD57: Arcade Games - Includes 2 truly commercial quality games. MegaBall, an Arkanoid-ish game, features 5 musical scores, multiple levels and addicting gameplay. Gravity Attack is a psychadellic trip through several different worlds—each distinctly different.

FD58: GAMES! - Includes Steinschlag; a great Tetris clone from Germany with music. SCombat: simulate battle between up to 40 players & monsters. Imperium Romanum: Battle up to 4 players for control of the Mediterranean in this Risk-esque game.

FD59: Game Potpourri - Xenon III is an almost exact clone of the commercial game of the same name...a great shootemup. Crossword will take lists of words & automatically generate word-search puzzles for any Epson compatable printer.

FD60: Games - In Nebula, race over a 3d world to destroy enemy installations. Interferon; a great Dr. Mario clone. Enigma; is it a gameor a puzzle?

FD61: Games - Solitaire; great graphics, plays two versions. Klide; an interesting piece of eye candy. Extreme Violence; 2 player kill or bekilled game. YATC; A Tetris clone with Artifical Intelligence. Genesis; create realistic 3d fractal worlds.

WORKBENCH DISKS

WB4:Telecommumnication - This disk contains several excellent pd communication programs designed to get you on line quickly and easily, Access (1.42) - A very nice ANSI term program based on Comm v1.34, but with the addition of several transfer protocols, Comm (1.34) - Latest version of one of the best public domain communications programs ever made on the Amiga, Handshake (2.12a) Handshake is a Full featured VT52/100/102/220

WB5: Fonts #1- Several fonts (35) for the Amiga, also included are five PageStream fonts,and ShowFont - a font display program.

WB6: Fonts #2 - ShowFont(4.0) This program allows you to quickly and painlessly view all 256 characters in a typical font. Large AmigaDos system fonts (many up to 56pts).

WB7: Clip Art - This disk is loaded with black and white clip art. Art includes, trees, watches, tools, US and State maps, and more.

WB9: Icons - Truly a multitude of various types and kinds. Also includes IconMiester, IconLab, and others great utilities to help generate icons.

WB10: Virus Killers - The latest and best VirusX(4.0), Kv(2.1), and ZeroVirus III.

WB11: Business - Clerk(4.0), finally a full featured business accounting PD program for the small to medium company. Includes receivables, payables, end of month and uch more.

WB12: Disk Utilities - This great disk is loaded with wonderful utilities for everything including making disk labels, disk cataloging, disk optimizing, disk and file recovery archive and organizing, and all sorts of file manipulation. A must have!
WB13: Printer Drivers and Generator - over 70 different drivers, and if these don't do it, with PrtDrvGen you can make your own.
WB15: Business - This disk contains a spreadsheet, a database, a project/time management program and financial analysis (stocks).
WB16: Business - This disk contains an inventory manager, a loan analysis program, a great calendar/scheduler, a rolodex program, and pennywise a good "Cash Book" accounting for home or office.
WB18: Word/Text Processors - This disk contains the best editors. Includes,TextPlus (v2.2e) a full featured word processor, Dme(v1.35) a great programmers editor with strong macro features,TexED(v2.8) an enhanced Emacs type editor, and a spell checker.
WB20: General Interest - DiskSalv V1.42 a disk recovery program for all Amiga file systems, FixDisk V1.0 another file recovery program with features DiskSalv doesn't have, 3DLock gives a 3D appearance to your WorkBench, Clean V1.01 a program to de-fragment memory, Tracer - trace any part of an image.
WB22: Fonts #3 - Several more great fonts. These, like the other font disks work great with Dpaint and WYSIWYG word processors.
WB23: Graphics and Plotting - Plot (20b) a three dimensional mathematical function plotter. Can plot any user defined function, BezSurf2 - produce awesome pictures of objects one could turn on a lathe. Can also map iff image files onto any surface that it can draw. Now compatible with most 3D packages, and VScreen - makes a virtual screen anywhere, great for DTP!
WB25:Educational - On this disk are two programs that can generate maps of differing types, World Data Base uses the CIA's data base to generate detailed maps of any entered user global coordinates. Also Paradox a great demonstration of Albert Einstein General Theory of Relativity.

KAO 3[1/2]" Blank Diskettes DSDD

10 for	$8.20	(.82 cents ea)
25 for	$17.25	(.69 cents ea)
50 for	$31.50	(.63 cents ea)
100 for	$61.00	(.61 cents ea)

No shipping charge on USA blank disk orders, Canada and Mexico add $.15 each, other foreign add $.50 each.

WB26: Disk Utilities #2 - MrBackup, KwickBackup - two well done utilities to do harddisk and floppy disk backups, FileMast - a binary file editor, Labelprinter - Disk label printer with very powerful features.
WB27: Nagel - 26 Patrick Nagel pictures of beautiful women.
WB29: Graphics and Sound - This disk has several different Mandelbrot type programs for generating stunning graphics. Includes, MandelMountains - a realistic terrain generator, Fracgen - generated recursive fractals from user input, Mandelbrot and Tmandel - two fast mandelbrot generators, also Mostra - the best IFF display program to date, will display ALL IFF's including Dynamic HAM, and Sound - a great IFF sound player, will play anything. Try this disk!
WB33:Circuit Board Design - several terrific routines for the electronic enthusiast, Including PCBtool - a circuit board design tool, LogicLab - circuit logic tester, and Mcad (1.26) a well done new release of this PD CAD program, now comes with predrawn common circuit components for insertion into schematics.
WB34: Utilities - Several well done utilities, some will require moderate knowledge of a CLI or Shell for setup, Chatter Box - this one will play any user defined sound after any event (ie. disk insert, mouse click, disk removal...), , Artm - The Amiga real time monitor, gives you full control of the Amiga OS, very powerful program, Helper - help program to make learning the CLI easier, and more!
WB35: 3D Graphics - This disk contains several neat programs to use with your 3d modeling/raytracing programs 3dFonts - Full vector font set for use with 3d programs, FontMaker - make 3d fonts from any system font, Make3DShape - create 3d shapes from any image, DumptoIFF - create 3d animations preserves pallet, and World3d - a demo program of a front end for use with DKBRender.
WB36: Graphics - On this disk are several programs to create stunning graphical images including, MPath - creates swirling galaxy images, Roses - produce an unlimited number of variations of images that a symmetrically similar to a rose, SimGen - display those spectacular images as part of your workbench screen, and RayShade - a very good raytracing program, create your own beautiful 3d graphic models with this one!
WB37: Educational - Educational games and puzzles that cover math, geography, spelling, and books. Ages 6 - 15
WB38: Plotting and Graphics - Plotxy is the most powerful full featured plotting package. Used by many colleges and universities. A welcome addition to our library! Highly recommended. Plans - a incredibly well done Computer Aided Drafting program, very full featured. Tesselator - a program that helps generates fantastic looking, recursive M.C. Ecsher type pictures.
WB39: Music - Intuitracker is a German offering of an exquisitely well done program that allows you to play music on your Amiga with CD like controls. Lets you strip out music from your favorite games or others and include them in your music library.
WB40: Music - "CD on a disk", 90 minutes of modern music on this well presented collection. Requires 2 drives or HD.
WB41: Music - MED an incredibly well done, full featured music editor. Create your own stunning music directly on your the Amiga. Similar to SoundTracker but better. Very powerful easy to use program. Version 3.20, which is compatable with WB2.04.
WB43: Business - This disk contains AnalytiCalc - probably the most powerful spreadsheet program on the Amiga. A full featured spreadsheet with many features expected in a commercial package. Requires 1.2 MB of memory!
WB46: Clip Art - HighRes clip art with the following motifs - embellishments (borders, dodads ,...), people, and transportation.
WB47: Clip Art - HighRes clip art with the following motifs - hair, drafting, summer, animals and macfood.
WB48: Clip Art - HighRes clip art with the following motifs - Holidays, music, medical, and misc.
WB49ABC:Animation Sampler - On this three disk sampler set (counts as two disks) are some of the best animations that have been created over the last three years. Several examples of "Movie" type animations some with spectacular raytraced reality (coolroby, watch, spigot and egg). Also several european style or "Demo" animation with incredible graphics and outstanding electronic music (akrilight, copersine, doc, dps2010, impact, and logodemo). These truly show off the creative edge of an Amiga!
WB50: Animation - Seven of the best european style animations or "Demos", including - scientific 451, subway (a U.S. entrant, also our favorite), sunride, thrstdemo, tnight, waves, and woow.
WB53: Graphics - Raytracing programs generate absolutely stunning realistic looking planes, rockets, buildings..., and surreal images often consisting of highly polished spheres and objects. C-Light is the most powerful EASY-TO-USE of it's kind we have seen to date. This is easily better, and more full featured, than similar commercial programs costing in the hundreds of dollars. Also, sMovie - a full featured video text titler similar to ProVideo, Broadcast Titler. Great video scrolling, wipes, special effects, and more...
WB54: Printing - This disk contains several routines to help with the chore of printing. Includes Gothic - Finally a Banner printer for the PD! PrintStudio - a well implemented all-purpose printer-utility with a very comfortable graphic interface and many advanced features, Lila - with ease, print ASCII files to a PostScript printer, and many more.
WB55: Application - XCopyIII - a full featured disk copier, make backups of copy protected disks. RoadRoute - find the quickest route from one city to another, highway description included. Diary - a diary program like "Dougy Howard M.D", Cal - a calendar program, Magman - a database tailored to maintain records on articles and publications.
WB57: Animation - This disk has several "Demo" style animations, including, Blitter, Lolly, Sun5, vertigo, vortex, and xenmorph.
WB59: Business - contains a great, very full featured stock market technical analysis and tracking program, also an appointment calendar, and more.
WB61: Intermediate Utilities - Includes programs to help to drasticaly decrease flicker in interlace and hi-res modes (antiflick), an Atari-st emulator, an eprom programmer, turn your amiga into an eight channel digital data analyzer or ocilloscope, and more.
WB62: Midi Utilities - Several useful midi utilities including, programs to transfer to and from several music programs to midi, a midi sysex handler, a midi recorder with timebase, display midi info, file sequence player, and a few scores.
WB63: Disk Utilities #3 - Several highly recommended programs to aid in removing duplicate files from your hard drive, performing file backups, Binary editing, fast formatting, file recovery, disk track recovery, and forced DISK VALIDATION of corrupt disks.
WB66: Icons #2- Lot's of neat icons. Also, several wonderful programs that to let you create your own icons, modify and manipulate icons and info structures.
WB68:Music Utilities - several good utilities for the Amiga music enthusiast. Includes, Noisetracker - a great music creation program, Sonix2MOD - converts sonix to .mod files which then can be used by noisetracker, soundtracker, and MED, SpeakerSim - a speaker design tool demo, Wondersound is an additive harmonic instrument design tool with a separate envelope design window and 16 relative harmonic strength and phase angle controls.
WB69: Music - This disk has over 90 minutes of classical and modern electronic music for you Amiga.
WB70: Desk Top Pub - Atcp - transfer Macintosh screen fonts, Mac or IBM format .AFM metric files, to Amiga screen fonts and PPage .metric files. With this program, open the door to the libraries of Adobe and PostScript fonts! Calendar - month templates in PageStream form. Post - a full featured postscript file display and print utility.
WB75: Music - over 100 instruments files (.inst) and sample sound files (.ss) for your music programs.
WB76: Applications - This disk contains Stichery - a often requested knitting design program, Lotto - a rather complete lottery tracking and prediction utility, SSS - this screen capture program can grab almost any screen including games, Today - a personal calender, Tarot - fortune teller, and Grammar - grammar checker.
WB79: Home & Business Accounting - Includes Ckbacct - the most complete checkbook accounting program going. LCDCalc - this well done calculator has a very large display and operates from the keyboard or mouse, Mileage master - monitor your automobile mileage with this mileage log, Grammar - a grammar checker, and Worldtime - find out what time it is in up to 50 global cities.
WB81: Great Applications - DataEasy a very easy to use, database program. Don't let the ease of use fool you, this is a very full featured database program including full printer control for address labels and mail merge applications. Also includes, TypeTut a good typing tutor, RLC a full featured label printer, Banner, a multi-font banner maker, and Budget a home accounting in a program. Highly recommended.
WB82: Animations - Four full length, well done "movie" style animations. Including, Coyote, JugglerII, GhostPool, and Mechanix. 2 disks, counts as 1.
WB83: Computer Art - this disk has some of the best Amiga generated computer art that we have collected in the past 5 years.
WB85: Graphics - Contains several programs for manipulating 24 Bit color images (ham-e) and a rather nice Iff Image processing package.
WB86: Centurian Press - An electronic newspaper - requires AmigaVision.
WB88ABC: The Complete Bible - A three disk set, with the entire text of the New Testament and Old Testament-King James version. Great search/print utilities. Three disk set, counts as three.
WB90: Rippers, Strippers and Beats - For the Amiga music enthusiast, this disk contains many programs designed strip music from your favorite games and programs. Music can then be played with your favorite Pd Music program. Also contains Drums, a very nice drum machine. This disk requires some knowledge of the CLI.
WB93: Workbench Extras #2 This disk contains the utilities that Commodore should have shipped with the Amiga; VirusX4.0, Snap, FixDisk (recover corrupt/deleted files), Disk Optimizer (floppy & hard), MachIII (screen blanker, hotkey, mouse accel., macro, clock utility), GOMF (a gurubuster)and PrintStudio.
WB95: Checkbook Accountant 2.1 - This is definitely commercial grade; we've seen many checkbook programs and this is absolutely the best. Full budgeting, transaction recording and report generation.
WB96: Dupers - Contains XcopyIII & Nib which will backup copy-protected programs. FreeCopy removes copy protection from several programs, and SuperDuper will crank-out fast AmigaDOS copies.
WB98: Business - Includes BBaseII a nice, powerful database; BizCalc—a personal or mortgage loan calculator with amortization capabilities, Loop—a flowchart maker, Formmaker - design professional forms on your Epson LQ-2500 compatible printer.
WB99: Lifestyles - Includes AGene—family tree program that tracks up to 600 people/marriages/etc. Landscape is a CAD program to create gardens/landscapes. Loom simulates an 8 harness loom; experiment with pattern design in an instant feedback environment.
WB101: Chemesthetics - is a program that displays molecules as a calotte model. This kind of display contains a certain esthetic attitude, even extremely poisonous molecules like nicotine and dioxine look quite nice.
WB102: Telecommunications - Contains the programs NComm 2.0 and VT100-29B. Zmodem protocols, XPR protocol support, full VT100 emulation. NComm's script language is so powerful it comes with a script file that creates a full-featured BBS system.

AmigaDOS 2 Release

It's Here!

Release 2.04 of AmigaDOS for the A500/A2000!!! Includes ROMs, disks and full documentation. Requires installation.

$95.00

WB105A&B: Workbench 2.0 Extras #2

This set contains the programs that should have been included with WB2.0. These powerful utilities take full advantage of the *many* new capabilities that are available in Workbench 2.0.
Tool Manager - a wonderful utility to add programs to your TOOL menu, create a collection of icons on the workbench to easily launch frequently used programs...and much more! A *true* must have utility!!!--*All* of our Amigas rely on this utility. (See the review in AmigaWorld-May'92)
Virus Checker - Full virus protection can be yours by simply dropping this icon in your WBStartup drawer.
Degrader - gives you tools to try to make non-2.0 happy programs work!
Icon - Enhances Workbench's "Show All" to display over 40 distinct icons for different types of files (text, IFF's, source codes, libraries, etc).
Font Editor - Create/edit bitmap fonts with full color support!
Screen Blankers - ala fractals and spliners and swarming bees! No more boring black screen. Colorful, interesting and highly hypnotic effects!
Requester Enhancers - no more stale "Please Insert Volume" requesters--these are animated requesters for *all* of the system's requesters.
CPUBlit - speeds up text displays for owners of 68020+ CPU's.
SafeReboot - adds a safe way to reboot your computer...can greatly reduce disk validation errors!

Two disk set, counts as two.

DEV DISKS

DD45: AREXX Programs - This disk contains several useful arexx programs and examples, PopCLI4 - The latest of a must have utility.
DD47: Pascal - This disk contains everything needed to program in Pascal. Includes, A68k (1.2) 68000 assembler, Blink linking software and PCQ (1.0) a modest Pascal sub-set compiler.
DD49: C Compiler - contains zc(1.01) fully K&R, zcc(1.0) front end, A68k(1.2) assembler, Blink linker.
DD50: ARexx #2 - a must have set of tutorials on ARexx and several useful examples and utilities for ARexx development.
DD51: Circuit Analysis - Aspice (2.3) A full featured program for electric circuit analysis.
DD52: Scientific - Includes Elements - an incredibly well done periodic table program with source, Scientific plotting - over 600k of Lattice C source routines that can be included in your own programs.
DD54: Compression - This disk is loaded with all of the best file compression programs and aids for the Amiga. Many of the programs can be used by the new user. Includes Arc, Lharc, Lhwarp, Pkax, PowerPacker a must have by all, Zip, Warp, and Zoo. Also IFFcrunch an excellent compression for IFF files.
DD55: ARP - On this disk you will find the complete ArpRel3.0 release including the full user docs, the full Developers guide. ARP is the official AmigaDOS Resource Project (ARP) release 1.3. ARP makes many improvements to AmigaDOS and makes your system easier to use from the CLI.
DD57: Advanced Utilities - Msh - like Cross-dos, copies files to and from MS-DOS, Pal-NTSC - convert any pal program to NTSC and vice versa, Also several utilities that improve your startup-sequence, plus 25 more programs.
DD62: Basic and Xscheme - Cursor - a full featured Amiga Basic compiler, sbasic and ftext - several wonderful routines to help in basic programers, and Xscheme - an interpreted object oriented language.
DD66: Programming ToolBox - Many programs to help in your development efforts (most for C some for basic) Includes programs to generate requesters, an incredible spritemaker toolbox, to greatly aid compiling, convert DPaint brushes to C structures, a great library manager, and many more wonderful time savers!
DD69:Advanced Utilities - SerNet and ParNet - Connect two Amiga's and share resources, MemMonitor - Similar to WFrag but greatly improved, Selector - put menus on your workbench screen, and more.
DD71A&B:C Compiler - This disk contains DICE, Matthew Dillon's full featured, powerful C compiler and environment system. 2 Disks, counts as 2.
DD72: VT Emulators - Contains three powerful full featured VT emulators, with many advanced features including Kermit, Xmodem and Tektronix protocols. VaxTerm, VLT, and more.
DD77: Fortran - Contains a full featured FORTRAN77 environmental development system. Also contains EzAsm a strongly macro dependent 68000 assembler.
DD78: Menus & System Enhancements - Several neat programs to aid in launching programs from special icons (Next computer style), adding WorkBench menus and more. Also contains many useful programs to determine operation system configuration, memory usage, load and many other important utilizations.
DD81: ARexx Tutorial - Includes several sample Arexx scripts and sample programs. Also includes APig; a library that gives you access to Intuition from within Arexx scripts.

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that increases your health meter.

To get anywhere fast, you need to visit one of the shops located in the game. There you can purchase one of 16 defensive and offensive items, ranging all the way from simple health potions and multi-direction weapons to such exotic and powerful items as chain mail, force fields, and flying machines. You don't need coins to buy them; instead, you must find the right combination of herbs and live pets (and the pets often don't just stand still waiting for you to grab them). As further self-preservation, you can replenish lost lives in three ways.

The puzzles in Elf involve more than just finding a key to open a door to the next level. You must interact with people and determine what they want from you before they will give you the information or object you need. Here, Elf uses a multicommand interaction screen that lets you carry on limited conversations.



Collect points, pets, plants, and spells to rescue your girlfriend.

The game is presented as well as it plays. The graphics and sound effects are great. Elf allows you to save your position, but only at the end of a level. It supports extra memory, multiple drives, accelerators, and look-it-up-in-the-manual copy protection.

Overall, Elf is fundamentally just a medieval-fantasy platform game, but it is also one of the best of this genre I have seen. Try it!

Bo Jackson Baseball; MicroLeague Baseball: The Manager's Challenge

By Peter Olafson

Earl Weaver Baseball (Electronic Arts) has been the Cal Ripken of Amiga baseball games. It seems like it's been around forever, and yet it still plays better than just about any of the competition. Now a couple of rookies are vying for Earl's spot: ***Data East***'s **Bo Jackson Baseball** ($49.95) and ***MicroLeague Sports***' **MicroLeague Baseball: The Manager's Challenge** ($49.95). While neither one is the all-around equal of old Earl, each lends some sparkle to the diamond.

Bo Jackson Baseball

Bo Jackson Baseball is bound to a be a hit with the action crowd. The reincarnation of Cinemaware's TV Sports: Baseball, it's a big, beautiful game, with fat colors, fluid animation, and lots of digitized sound. It's also a damn sight tougher than most of the action-oriented games.

The batting is more murderous than Murderer's Row: The pitches come in fast, and it can take quite a while to find the right spot on the screen to use for triggering your swing. Pitching (from the same umpire-like perspective) uses a routine taken from free-throw shooting in TV Sports: Basketball. A ball moves back and forth behind the plate. You hit the fire button when it's where you want the pitch to go, and tug the joystick to determine its speed and breaking direction. (Unfortunately, there's no way to take the batter high or low.)

Fielding's the easiest part. You guide the flashing fielder to a marker indicating the spot to which the ball is headed, then make him jump or dive for it.

Those are just the fundamentals. You can choose among 26 teams—drawn from major-league cities—and play exhibition matches or a 162-game schedule. An excellent editor permits you to set rotation, pick versus-lefty and versus-righty lineups, and change everything about a player except the pattern of his shorts. Unfortunately, only three fictional stadiums are provided, and the players are imaginary creatures. (Ah, for an Major League Players Association license, eh?)

There are a few flies in the clubhouse. Bo is a bear with chip RAM under a half-meg Agnus, and you'll need to close all windows and end all tasks to avoid crashes within the game—especially when running from hard disk. The computer-versus-computer mode doesn't work, and I've

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and carried around without its use being readily apparent. (It also may not have any use at all.)

Try to grab everything, but carry only what you need. Keep what you think you're going to need soon at some central location nearby. If you start to run out of room, check your spell recipes, and see what items you can convert into incantations. It's much easier to carry weightless spells than their components. (But don't be too hasty; there are some one-of-a-kind items that you need in their original state, and which, once converted, can't be restored.)

Down in the basement, you can pass the time of night with the old Indian. He's a solemn bloke, and, unlike some other creatures in these parts, he doesn't mutate into a monster, but he'll give you the lowdown on what's happened. He's properly sensitive on certain issues, however, and he'll clam up if you start making Indian jokes, so be a grown-up, OK?

Now we're just about ready for the studios themselves. The easiest one to tackle is the haunted house (door #2). Once in, hang a left in the foyer, and you'll enter a cozy parlor. Check out the suits of armor for better protection, and the door to the right for your first encounter with the Nether World. This spectre won't hurt you, but neither will he get out of your way. He's easily distracted, however, by a toy from the playroom. (Up the right stairs, bear right and then left down the hall; it's the door on the left.)

Inside the library, you should try to read a book from every shelf—it's not just useful, it's fun—and be sure to collect the formula that will fall out of one.

On to the dining room, where a couple of gross sights await you—one under the silver platter and the other through the service window. Courage spell or no courage spell, there's just one way to go at the second of these: You're going to pass out, you big chicken, and you're going to wake up in the freezer with a stack of bodies (I was *wondering* where everyone was) and no obvious exits.

You can collect a few goodies here—the boots on one of the bodies are another good piece of armor—but how to get out? The temperature gauge beside the door is

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disk
MESSY-SID A115 Easy to use PC-AMIGA file transfer program, very high in the UK popularity charts, this one
MIDI DISK A206 Lots of useful utilities for MIDI
MIDNIGHT THIEF A067 A great text adventure for hackers
MISSILE COMMAND A177 Good version of the ever popular classic arcade, a hit on the UK BBC micro when it appeared
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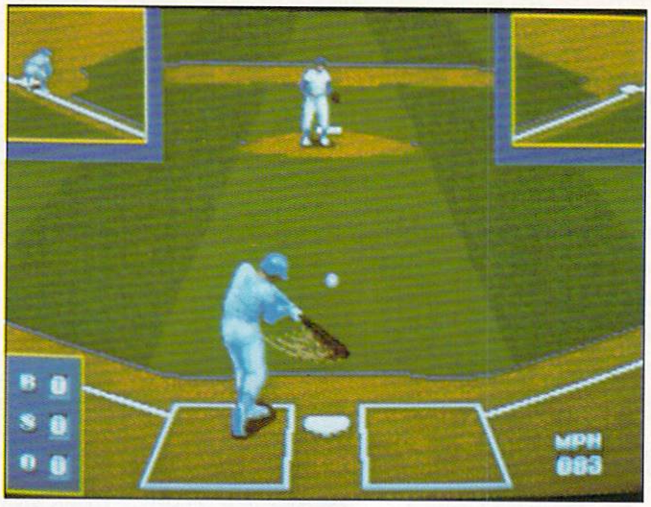
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From p. 92.
heard about—but haven't been able to reproduce—a problem of computer outfielders failing to chase balls. (At this writing, Data East was about to start duplicating a bug-fixed version.) Finally, it's disappointing to find that, while league standings and a wealth of accumulated stats have been provided, the ability to rank stat-category leaders is missing.

Bo Jackson Baseball is lots of fun, however, especially once you get the hang of the hitting.



Bo Jackson may be out of the majors, but he's on the Amiga.

MICROLEAGUE BASEBALL: THE MANAGER'S CHALLENGE

For league play, MicroLeague Baseball is the way to go. While Bo knows the batter's box, MicroLeague puts you on the dugout steps. Perspective is full-field. You make selections from a menu, including the sort of pitch the batter is expecting. The results that are played out automatically come from a statistical model rather than your supple wrist.

The heart of the game is strategy, and the options that are available are many: six for pitching (not counting the five types of pitches), six for infield play, and four more for the outfield. There's not much you can't do. Trades come with a separate General Manager disk, and in two-player mode you can even have a blow-by-blow pitcher-batter confrontation three times per side per game.

There's something rather small and removed about the quality of play, however, a sense of playing a computer game *about* baseball rather than playing baseball (the feeling you get from Bo Jackson). The sounds are rather disembodied, and screen scrolling and ball movement are a bit jerky. Not to say it isn't pretty. The screens do shine. The tiny players are animated in charming detail. The mouse-driven interface allows you to get where you're going in a hurry, and neatly-boxed data is easy to read.

But the graphics and sounds are really just a nice sidelight. In terms of stats and manager options, MicroLeague rivals Earl Weaver Baseball and sometimes surpasses it. Among other features, MicroLeague incorporates player fatigue over the course of a full season, adds five reserve slots to the standard 25-man roster for use if your regulars are injured, and compiles batting and pitching stats—not just overall, but broken down versus lefties and righties. Not even Earl Weaver Baseball II does that!

From p. 92.
the key. Use the curling iron from Elvira's makeup kit to heat things up, and when someone comes to investigate the alarm, lay into him. (Just be ready first; he's kind of tough.)

Down to the cellar you go. You can't do anything in the lab (yet), but there's a lot of useful spell-related stuff here to steal, and likewise upstairs in the kitchen. (Save the meat cleaver as a weapon.) You'll need one of those spells—Turn Undead—in the dark corridor that runs back to the foyer. (This is the same corridor down which, from the other direction, you can see Elvira's silhouette. Don't worry; there's no puzzle here. It's just an illusion to keep your blood up.)

If you take the left stairs and turn left, you'll find a bedroom dead ahead of you. Dead is right. (Take a look at that fellow on the bed.) You'll have to fight a spirit for the scripts in his hand—he shouldn't be much of a challenge—and be sure to grab the pictures that fall to the floor afterward. Note that you're simply told of the pics; they don't appear on the screen. Jump to the "Room Scanner" to find them.

Always look under beds and rugs in adventure games. Here, there's a little button that opens a panel behind the bed. Go on in, making sure you have the crucifix first, and take the chalice and the black candles. (For some lethal fun, save the game and leave the cross behind.) Congratulations. You've just nailed two major components in offing Cerberus.

Next time, we'll rock the rest of the house and try to stop you from dying in the catacombs. If you're having trouble with an adventure or role-playing game, you can write to me at: 25 Belmont Ave., Madison, NJ 07940, or via electronic mail on GEnie and Portal at PETEROO, and on CIS at 74160,3053. ■

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THE LAST WORD

Kudos, complaints, comments, concerns, and contributions from our readers.

CD-ROM Wrinkles

John Foust's article "Plunging into CD-ROM" (Mar., '92) was very informative, and it was particularly fascinating to learn that many CD-ROMs marketed for MS-DOS machines are indeed compatible with Amiga CD-ROM drives.

I want, however, to share some facts about CD-ROM compatibility that were not mentioned in the article. First of all, a minimum of one megabyte of chip RAM is absolutely necessary to run CDTV titles on any Amiga. (CBM's CDTV unit has a two-meg Agnus chip like the A3000 and some European A500s.) I am about to treat my early A2000 to a one-meg Agnus upgrade for this very reason.

Also required is CDTV emulation software, which is now becoming available from Amiga CD-ROM drive/driver vendors. In addition, be aware that a sizable number of CD-ROM and CDTV titles are currently incompatible with 68030 CPUs and/or AmigaDOS 2.0. Caveat emptor!

I hope these hints help other Amiga CD-ROM/CDTV fans avoid these compatibility pitfalls. Thanks for the valuable article; more such (including reviews of specific CD titles) would certainly be welcome.

David Levy
Burlington, Mass.

Better Software Needed

I think you're wrong in saying (in "Chief Concerns," Feb., '92) that "The Amiga, too, can do quite well without Lotus 1-2-3 and Dbase." Anyone who does serious work these days needs good productivity software. Are you saying that such people should buy *two* systems, one for serious work and one for games/video? Get real, Doug. The Amiga may be the black sheep of the computer family, but it doesn't *have* to be.

It would surely be beneficial to Amiga owners if persons such as yourself would encourage—rather than discourage—developers to write good productivity software for the Amiga that could compete with that of the Mac and PC. I find it very aggravating to spend hundreds of dollars for Amiga software that is not nearly in the same class as PC or Mac programs typically costing only about 50% more than their Amiga counterparts.

Ross C. Wilkinson
San Francisco, Calif.

IBM Compatibility

I am a computer consultant in the world of IBM PCs. At home, however, I enjoy the ease of use of my Amiga 2000. Frankly, it runs rings around the PCs, but IBM compatibility is highly desirable, so I installed a 286 Bridgeboard about two years ago. Since then, I've extended the PC/AT bus to the last two slots and am "fully populated" with an internal 2400-baud modem, a RamPage 8000 memory board, and an 80-meg IDE drive.

Get real, Doug. The Amiga may be the black sheep of the computer family, but it doesn't *have* to be.

I'd really like to see a 386 Bridgeboard—one that supports VGA, boots from an IDE drive, allows a 9-meg address space, and sells for under $1000. Is there any hope?

John H. Abrams
Floral Park, New York

Saluting Good Service

We often read about how bad some companies' customer service is, but this letter is to say just the opposite!

I bought a G-Force 040 accelerator and installed it in my A3000 according to the instructions, but then had problems with it on boot-up and sometimes on warm reboots, too. When I contacted GVP's BBS and left E-mail, I received a very prompt reply from Robert Miranda of their tech support. I think he and GVP should be recognized for their conscientious efforts to solve my problem. I hope this will be an incentive to other Amiga companies and dealers to do as well.

Lawrence Aubin
North Uxbridge, Mass.

I bought an ICD Advantage 2000 and a Quantum 105-meg hard drive, and they both operated without a hitch on my A2000 with Rev. 4.3 motherboard and Microbotics' 8-UP! RAM expansion. But when I fitted an ICD AdSpeed, nothing would work. In fact, the machine would not even boot, GURUing before it started.

The point of my letter is to praise the helpfulness and patience of ICD, in particular the two men in the Amiga technical section. After hearing my problem, they suggested that it might stem from incompatibility with my RAM expansion, and they sent me—without charge—an ICD AdRAM to try. Unfortunately, it did not solve the problem, and to complicate matters, I had in the meantime installed Workbench 2.04, which would not work with the hard drive. So I returned the AdRAM and made more phone calls, and within two weeks received—again without charge—two upgraded chips for the hard card. Now I have a machine that operates as it's supposed to.

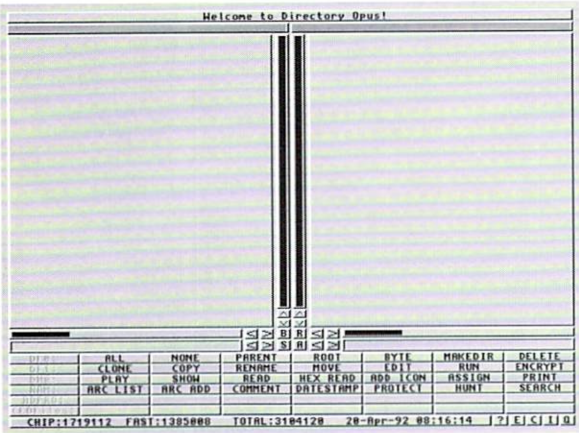
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Mark Sims
Hamilton, New Zealand

Is your directory utility dull, weak, and generally unpleasant?

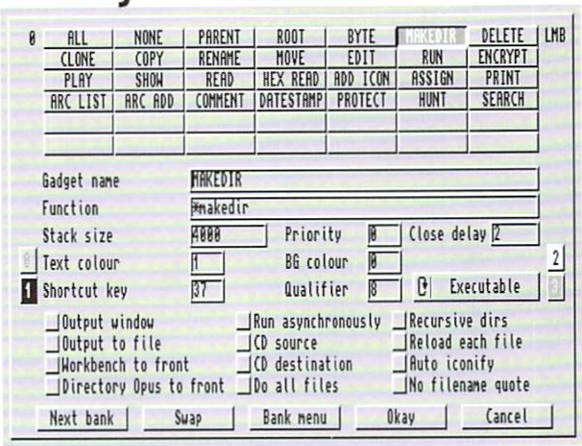
Do Something About It!

You start out with this...



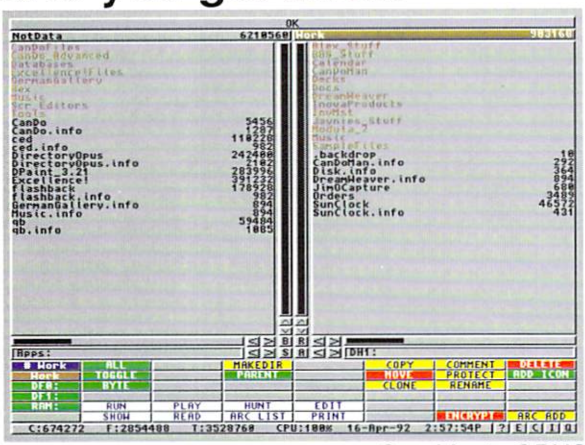
default configuration

then you use this...



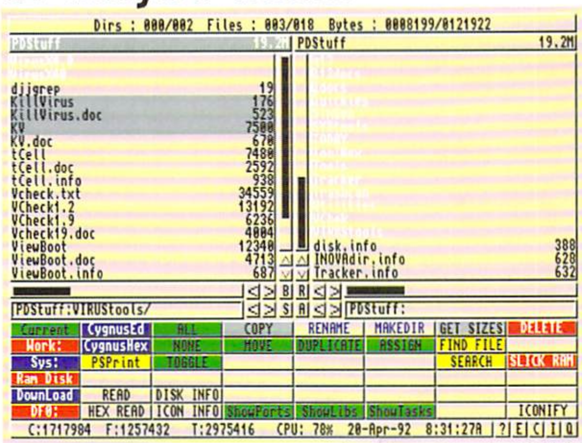
gadget config screen

and you get this...



One Man's OPUS

or maybe this...



Another Man's OPUS

But only if you have this:

directory OPUS

version 3.41

from

INOVAtronics

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"The extent to which OPUS is configurable is astounding. Everything, down to the action that OPUS will take when you double-click on a file, is configurable...Five Stars (highest rating)"
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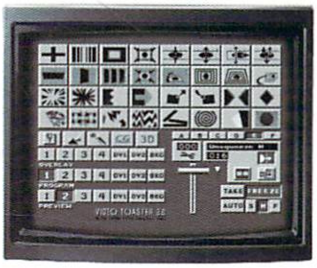
Circle 75 on Reader Service card.

INOVAtronics, Inc.• Suite 209B, 8499 Greenville Ave, Dallas, TX, USA 75231-2499• Phone 214-340-4991• FAX 214-340-8514

New Video Toaster™ System 2.0 – New Effects, Ray Tracing, and even better Character Generator.

Video Toaster™ System 2.0:
9 essential tools you need if you're using your Amiga for video or graphics.

4 Input Production Switcher



Toaster System 2.0 includes organic switcher transitions like fire, smoke, clouds, pouring liquid and breaking glass. Powerful positionable effects for over-the-shoulder insets, soft-edge wipes and wild "KikiFX" like you've never imagined.

Digital Video Effects



Real-time digital video effects on live video at 60 fps. From flip, spin and tumble all the way to amazing perspective warping effects and even incredible sphere and cube mapping in real-time.

35ns Character Generator



16 million color 35ns broadcast text with over 100 high-quality, anti-aliased type-faces. System 2.0 also features faster loading of pages, framestores for backgrounds, improved keying and text file import.

24-bit Broadcast Paint



ToasterPaint is the only true broadcast-quality NTSC paint system for the Amiga. System 2.0 brings new features including improved auto-scrolling and direct import of images from the Toaster's frame grabber.

3D Animation



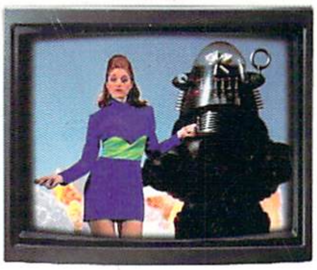
LightWave 3D 2.0 offers over *150 new features* including blazing rendering speed, multiple morph targets, 3008 x 1920 resolution and *true ray-tracing!* 2.0 makes modeling a joy with new tools like bend, twist, taper, skin and magnet.

Dual Frame Buffers



Hold two high-resolution 16 million color video frames in perfect YIQ-encoded RS-170A network quality. System 2.0 brings you enhanced hue matching, even faster loading, and framestore file compression to save disk space.

Luminance Key



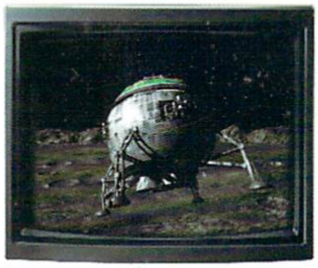
Much more than just simple weatherman over a map, Toaster™ keying lets you do luminance fade transitions, or combine two live sources using a third source as a key and even key-based digital trails.

Color Processing



Control of color effects from the switcher and 20 new default effects make ChromaFX faster and more powerful. Now combine effects and color cycle with new organic switcher transitions for incredible new possibilities.

Still Store/Frame Grabber



Freeze flawless broadcast resolution images instantly from any color camera, laserdisc or even cable TV with better color reproduction, faster loading, and powerful new field and frame saving options.



Free Toaster™ Video Tape

We can't show you the power and quality of the new Video Toaster in a magazine ad. So we've decided to prove it with a free VHS tape about the Toaster *produced entirely with the Toaster.* This award-winning demo-within-a-demo starring NewTek's Kiki Stockhammer is aptly titled **"REVOLUTION"**. Call today to find out about the most successful Amiga product of all time.

Call 800·765·3406

Toaster 1.0 users call your dealer or 800-843-8934 to upgrade today.

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